NOTES 4/1/63 Rudolph

B 4/4

No Notes

B 4/4

NOTES 4-1-63 GORMAN

1. PROCUREMENT OF TELEMETRY EQUIPMENT: You will recall that this problem has been discussed at the last two Board Meetings. I dug into this over the weekend and I believe you do not have the complete story on this problem. I am preparing a report for your and Eberhard's information. I will also attend the meeting today at 10:30 with Saturn Systems, Astrionics, and Procurement and Contracts. We will have a firm recommendation for your approval by the end of the day.

Gorman's report given to Dr. von Braun 4/5/63

Bowie

Make sure I read it!

B

NOTES 4/1/63 CONSTAN B 4/4

1. ETS HOKIN & GALVIN

On March 25, 1963, seventy-five electricians failed to report to work. It was later determined that the cause of the walk-out was a dispute between the company and the union over the discharge of a shop stewart. The shop stewart will go before a grievance committee on Tuesday, April 2, 1963. The IBEW has agreed to man the job and the electricians are back at work. ✓

NOTES 4-1-63 FORTUNE B 4/4

1. HANCOCK COUNTY PATROL: This started to day and will cover the Fee and Buffer areas in Hancock County only, not Pearl River County or Tammany Parish. The guards were screened by Mr. Winterstein and approved Friday. Badge and Car Decals to identify permanent MTO employees, Contractor personnel, Construction personnel, etc., requested by the County Board of Supervisors, have been discussed with Security representatives here. We all agreed that it would be too costly a job, and an ineffectual one as well, to set up so broad an identification system at this time, particularly since we can not close off Highway 43 until late calendar year 1964.

* 2. MOVE OF SENATOR STENNIS STAFF ASSISTANT TO MISSISSIPPI: T. Marx Huff has established an office in Jackson, Mississippi to help the Senator's constituents locally and to keep him advised on Mississippi Test Operations. We have agreed to provide him with copies of all our local News Releases and Slattery has OK'd giving him copies of Marshall Releases which relate to MTO. However, one of his primary purposes is to foster Stennis campaign for the Mississippi Senatorial Election versus Ross Barnett and I do not feel we should get involved in apparent favoritism of one over the other. We will, therefore, continue to work with the State A&I Board in these matters as well. I intend to call on both offices in Jackson Thursday morning, before talking to the Mississippi Congress of Parents & Teachers.

* 3. RELEASE OF INFO ON GE TECHNICAL SUPPORT OF MTO: Phillips, local Brown & Root representative, reported last Wednesday that Mr. Webb had sent a copy of his letter of March 5 to Senator Stennis regarding this subject, to George Darnielle, Assistant to the President, B&R. Darnielle supposedly was flying to Washington Thursday to inquire if there still might be something for Brown & Root to do at MTO. He wanted to see me on his way but I referred him to Wilbur Davis for any contacts on this subject.

4. POSSIBLE COMMUNITY RELATIONS PROBLEM WITH COAST ELECTRIC: Mr Hardin Shattuck, Presidnet, Coast Electric, is very upset at the Corps of Engineers handling of Coast Electric Property in the MTF Fee and Buffer areas. The Corps took several months replying to his inquiry and promised salvage value for the lines, poles, transformers, etc., in the Fee area only. He intends to fight this in court, in the Press, and by every public means possible. I suggested he call Col. Raymond rather than deal with junior MDO personnel, if he was not satisfied. While we have turned this over completely to the Corps, I feel it might boil up to some bitter feeling against NASA, therefore, have agreed to see Mr. Shattock at MTO this Friday.

NOTES 4/1/63 GEISSLER B 4/4

1. Saturn V and Saturn IB Wind Tunnel Programs: MSC's and MSFC's planned wind tunnel programs on Saturn V and Saturn IB were compared early this month. Some redundancy was detected in the area of total vehicle tests for which MSC needs data for abort and miss distance studies. MSC agreed that Marshall should be the responsible agency for these tests and we in turn will furnish data to them through Flight Mechanics, Dynamics and Control Working Panel. MSFC and NAA-Apollo engineers will be in Huntsville on April 3 to discuss the test program consolidation which may result in a slight augmentation and schedule modification of our test plans. Also, since much of this type of testing is done in our 14-inch tunnel, NAA people would like to familiarize themselves with our facility.

2. Guppy No. 2: Aeroballistics Division is cooperating with Test Division to furnish MSFC management a firm recommendation regarding the feasibility of an air transporter with S-IVB capability (Guppy No. 2). It was learned from Mr. Balch of M-DIR staff that the recommendation must be firmed up by the middle of June. Aeroballistics' analytical and experimental aerodynamics branches with assistance from Boeing (tunnel test and model modification) and Northrop (stability analysis) will carry out the task. Of course, the short time and funding can only lead to a preliminary analysis establishing the feasibility of the proposed change. Approximately $60,000.00 funding of both the Boeing and Northrop efforts seems to be assured.

3. Apollo Mission Control: Dr. Haeussermann requested that Dr. Speer, Aero. should co-chair the planned MSC-LOC-MSFC panel to examine, in detail, the requirements for Apollo mission control. Other MSFC nominations include Richards (ASTR), Kistler (P&VE), Felder (COMP), Williams (LVO). In response to an urgent request from Walt Williams, MSC the first meeting is scheduled for April 3 in Houston.

4. SA-4 Launch: Telemeter Link #10 was successfully recorded on board of the vehicle, and 55 sec of data including the retrorocket blackout period were played back at 165 sec and received very well in Huntsville. We want to gradually build up this real time evaluation capability. Most of the important S-IV data on future Block II flights will also be directly visible from here.

5. LLS Phase II Final Report: Comments from the contributing divisions and offices are being received to day (March 29) on the Summary Volume (I) of the eleven volume LLS Phase II Final Report. Comments will be incorporated, books will be published and distributed by April 5 to all NASA LLS participants.

NOTES 4-1-63 GRAU B4/4

1. S-I-5 INSTRUMENT UNIT: Status, continuity tests and installation evaluation were completed.

2. S-IV-5 CHECKOUT: Leak and functional test of the S-IV-5 vehicle was discontinued by DAC on March 22, 1963 with about 40% completed. DAC is presently running the electrical and telemetry tests, including the hydraulic sub-system test, after which leak and functional testing will continue.

DAC is planning to perform approximately 50 items of work at the Sacramento Test Site on the S-IV-5 vehicle. Some of this work is considered major assembly which will void portions of the checkout operation conducted at Santa Monica.

D.F. What steps do you propose to take? B

3. S-I-6 PRE-STATIC CHECKOUT: Testing of the S-I-6 is continuing on schedule. Since March 21, 1963, the Guidance and Control System was completed, the R. F. compatibility test was completed, Instrumentation calibration was completed on installed components (90% of the instrumentation is installed) and on March 28, 1963, the Telemetry calibration test was in progress.

4. CATEGORY 215 ITEMS: Specifications for all category 215 semiconductors have been prepared and are either being printed or are in the process of sign-off by cognizant personnel. Category 215 components are electrical-electronic, electro-mechanical parts and are procured in accordance with the latest applicable Military, Federal or Marshall specifications or standards. Purchase descriptions of all 215 category semiconductors have been prepared and are being sent to Technical Materials Branch for use in establishing stock levels for 215 category transistors and diodes.

5. NASA HEADQUARTERS FUNDING: Funds have been allocated by NASA Headquarters for continued development of the NASA Quality Assurance and Reliability Training Program through the remainder of FY '63.

Omit (K) 6. CENTAUR: Two of our Quality Assurance Division Representatives at General Dynamics/Astronautics completed their assignment at San Diego last week. Our Senior Representative will remain at GD/A until approximately June 1.

The Centaur Test Vehicle (formerly the F-2 vehicle) has completed checkout at GD/A and was shipped to Cape Canaveral on Friday, March 15. Our Senior Representative at GD/A followed the vehicle to the launch site and participated in the receiving inspection activities.

NOTES 4-1-63 GRUENE B 4/9

1. SA-4:

a. Movies available up to and including 1 April do not show major parts coming off. Additional movies will be available and analyzed on approximately 3 April.

b. Additional telemetering indicates that tape recorder worked normally. No increase in temperature in Engine 5 area could be detected after cutoff of this engine.

2. Facility 37: Col. Petrone assured me that Facility 37 would be ready for the scheduled wet fueling test and acceptance of S-I stage for SA-5 on 20 June to make a launch within the third quarter unless unforeseen difficulties develop during the tests. Tracking problems were already resolved. The hoist problem will hopefully be resolved this week.

3. Douglas Aircraft Designed Umbilical Disconnect: During a rain simulated disconnect test under H-2 conditions, the Douglas Aircraft disconnect failed on the test stand. The LOC designed umbilical, which was fabricated in the meantime by Brown Engineering Company, was put into place and tests will start during this week.

B 4/4

NOTES-4/1/63-HAEUSSERMANN

1. BOSTON ELECTRONIC RESEARCH CENTER: JPL is as much concerned as we are. Dr. Pickering, however, does not feel he can do very much about it, mainly because of political reasons. California cannot claim to do everything. The subject was also briefly discussed at the Advisory Committee for Guidance, Control and Navigation. Except personnel present from OART, nobody favored the establishment of the new Center. Several members opposed it as I did. Dr. Draper supported it from the viewpoint of centralizing "instrumentation" efforts within NASA as "propulsion" is centralized, but he did not see a need for a big 2100 man center. Mr. Gilchrist (OART) had been told that Dr. A. Kelly visited you for the sole purpose to discuss the Research Center! Haha! Wasn't even mentioned. B

2. VISIT AT DAC: Last October DAC did not believe in receiving Moog actuators in time; thus GSE and on-board wiring changes have not been provided on S-IV-5 and 6 despite our directive of March 20, 1962. Now we are boxed in by fund and schedule requirements and thus cannot introduce the improved actuators before S-IV-7. No technical shortcomings were given to justify the delay. In general, the flexibility of DAC for introducing minor changes leaves much to be desired. I consider their attitude as an endless exploitation of situations to obtain additional funds and manufacturing time.

→ Do. Lange - SAT
Let's discuss this item with Charley Abee on his forthcoming visit to Huntsville B
(Please take this up with Lindstrom + Ferguson also)

NOTES 4/1/63 HEIMBURG

B 4/4 — I called Wingle again who promised to push it. He sees no difficulties on his side (re AETRON) B

1. MTF: NASA Headquarters approval not yet received for MTF technical systems procurement plan. Procurement plan for cryogenics which includes provision for manufacturing facilities in the MTF area was submitted to NASA Headquarters, 3/26/63, by M-P&C; approval not received to date. Mobile District Corps of Engineers awarded contract to A. M. Kinney, Inc., Cincinnati, Ohio, for final design of MTF high pressure water pumping station.
Government ownership of telephone system at MTF, as recommended by us, has been approved and necessary action to obtain interim service is now being accomplished.

* 2. MARINE ACTIVITIES: PROMISE scheduled to depart MSFC, noon Friday, 4/5/63, with SA-5D aboard. Estimated arrival time at Cape, noon 4/16. ✓

* 3. S-I-5: Static firing operations complete. SA-5 will be removed from test stand, Tuesday this week. ✓

* 4. S-IV BATTLESHIP, DAC/SACTO: Full duration (460 sec fuel depletion) successfully completed, 3/28. Helium heater okay. ✓✓

* 5. RL10A-3 ENGINE TESTING, MSFC: Forty-second firing successfully completed, 3/29, using 10-second lox chill-down. Previous attempt with zero lox chill-down aborted due to "burn-wire" malfunction. ✓

6. S-IVB FACILITIES: M-TEST recommends not building third S-IVB stand at DAC-SACTO at this time. This will result in immediate cost saving (FY 64 funds) of approximately $7 million, and in better test programs for DAC and MSFC. (Good!)
Need for third stand arises from two conditions: 1) almost vertical schedule for battleship, all system and 201 stage. This is caused by: a) 201 launch schedule and b) all-system/201 being parallel assemblies. 2) Later in program, because of schedule used by DAC for static firing operations, stage demands would overload two stands. ✓
Proposed Solutions: a) ~~Differ~~ Defer design and construction of third Beta test stand until more firm requirement and some concrete knowledge of S-IV usage can be made; may can modify S-IV stand. b) Stand No. 1; Remove battleship from stand early enough to get stand ready for 201 with automatic GSE. c) Stand No. 2; Prepare stand initially with automatic GSE and fire all-systems. d) In the period when stand No. 1 is down for modification and stand No. 2 has not started operation, transfer remaining battleship test program to MSFC for performance. ✓

This is final & definite! B

K.H. There will be no more S-IV's than in the present program. Any need for more Sat I-type carriers will be transferred to Sat IB meaning more SIVB's, but not more SIVs! B

7. GSE - SWING ARM NO. 2 - LC-37B SPARE: The DAC liquid hydrogen coupling on arm No. 2 failed to release during R&D test under simulated launch conditions with water spray, causing considerable damage to the coupling and vehicle simulator. Investigation revealed ice had formed around the coupling sliding surfaces, preventing the coupling from releasing. DAC does not have a fix for the water spray problem; therefore, the second phase of the test program will be initiated using LOC-design accessories on swing arm No. 2. ✓

Dr Lange
for your info, too

B 4/4

NOTES 4-1-63 HOELZER

1. ORBITAL DOCKING SIMULATION PROJECT: Fabrication of the Target Motion Simulator for this project will take longer than the time estimated. It is now scheduled for completion in July. At that time the complete system will be ready for operation. ✓

NOTES 4-1-63 HUETER B 4/4

* 1. LUNAR LOGISTICS PAYLOAD: Preparations are virtually complete for Tuesday's scheduled presentation of MSFC's tentative approach to a lunar payload development program in a general line with OMSF's specified program and guidelines. Information generated for this exercise is intended to serve as a basis for informal discussions with Mr. Taylor, OMSF. Further, the exercise will provide a current basis for FY 65 budget purposes. It will be emphasized that Marshall has not had time to verify the feasibility or practicability of the OMSF proposed approach nor does the information to be presented constitute official MSFC submission. ✓

2. VOYAGER: Twenty-two requests for proposal have been sent out to Aerospace firms for Voyager studies. Proposals were due by March 25.

During the next 3 months, JPL's Voyager Study Group will concentrate on the conceptual study of an Orbiter/Split Capsule mission. (JPL hopes that this study will produce strong arguments for congressional support in FY 65). The following general criteria were determined for the Orbiter/Split Capsule study:

a. The study will be on the Mars 1969 mission using minimum energy trajectories.

b. Capsule separation will occur prior to orbit of the bus.

c. A capsule weight of 500-1000 lbs. will be considered.

d. Two configurations will be investigated:

(1) Using a solar cell, or (2) Using a RTG (Radioisotope Thermionic Generator). ✓

* 3. MULTIPLE MISSION MODULE: Discussions were held during the past week on various aspects of the MMM. An evaluation is currently being made to determine the merits of one or two engines for all the anticipated uses. The results of this evaluation should be available by the end of this week.

It is planned, in connection with the OSS sponsored study for a Saturn 1B/3rd stage vehicle, to have a full scale non functional mockup of the MMM available around June 15. ✓

H.H.
I thought that had been done long ago.! B
(But I'm greatly interested, nevertheless)

NOTES 4-1-63 KUERS

B 4/4

I understand this may cost us 2 to 3 months!!! (per Lange Notes 4-1-63) W.K.

1. Saturn V, S-IC Stage:

a. A critical area is showing up in the development program of Pressure Volume Compensators at Arrowhead Products. As it looks now there is a delay of 2 to 3 months in the program caused by late design changes and by a two conservative management approach in ordering material in advance, providing for sufficient spare parts, putting a sufficient number of people in purchasing and follow-up activities, etc. Immediately affected is the schedule for hardware for qualification testing and for components for single engine testing for Test Division needed by the end of this year. We had several meetings with the Vice President of Arrowhead and their key people and hope at least to avoid further slippage and possibly catch up some of the lost time. ✓

This is the kind of thing we simply cannot tolerate!

b. As a back-up and product improvement program for the Boeing Y-Ring production using a conventional multi-pass welding process we have initiated a contract with Sciaky Brothers for design and fabrication of a split vacuum chamber and an electron beam gun programmed for the special application of Y-Ring welding. We have not pushed this program too much because Boeing has been quite successful in producing acceptable Y-Rings. Sciaky Brothers, however, have hit some critical problem areas in their E. B. Gun program. First it was found that for E. B. welding of 2219 aluminum alloy a 30 to 40% higher power level for the gun is needed than would be required for any other aluminum alloy. This fact was not known before and has not been explained yet by metallurgists. As a consequence of raising the power level of the E. B. gun to 30KW, (1 Amp, 30,000 volts) an arcing problem was encountered between the cathode and anode which results in unacceptable welds. Considerable improvements have been made today, but the problem is not yet solved. As a back-up we ordered a 80,000 volt gun which has a longer focus of beam and would allow to position the gun at a greater distance from the work piece reducing the interaction of vaporized metal and the gun. ✓

I hope the Arrowhead man has really been chewed out good! Shall I send him a fiery follow-up letter? If so, please draft one. B

2. Vehicle Structural Technology Laboratory: On Tuesday, April 2, we will present our methods development projects and experimental programs in a condensed form to Mr. Crone and his people in Washington in preparation for a final presentation to Mr. Smolensky. ✓

NOTES 4-1-63 Koelle

B 4/4

1. PARAMETRIC NUCLEAR STAGE STUDY

We have just evaluated one of our few new studies on the subject of a nuclear stage on top of SATURN or NOVA, with thrust levels in the 100K to 800K range, all based on solid-core reactors. This study is for Mr. Finger's office. It is $150,000, and for a time period of nine months. The evaluation team under Will Jordan recommends STL as first choice and Martin as an alternate. Do you have any objections to this choice? → No B H.H.K.

*2. NEW PROPOSALS

This week we will begin the evaluation of two other proposals just submitted by industry. One is on "Human Factors for Orbital Maintenance and Repair," which will eventually produce a design handbook, and the second concerns the development of a computer program for the evaluation of propulsion systems and entire modes of operation for planetary transportation systems. This is part of our overall operations analysis program. We will let you know the results of our evaluations in due time. ✓

3. EARTH-TO-ORBIT TRANSPORTATION SYSTEMS

We have just completed a study which gives a "bird's-eye view" on the overall situation concerning earth-to-orbit transportation. It consists of 23 slides and takes 40 minutes. I would like to offer this for a board meeting when time is available. It puts our entire effort in launch vehicle development in proper perspective.

→ H.H.K.

Please take up w/ Mr Neubert for scheduling. Do you want to present it "as is" inspite of what we discussed 4/3 ?

B

Notes 4-1-63 Lange

B 4-4

1. SATURN I: S-IV Battleship - A successful propellant depletion firing of approx. 460 secs. was accomplished on 3-28-63. Both propellants were just about depleted at cutoff. Helium heater and LOX pressurization system worked satisfactorily. Minimum helium bottle pressure was 650 psia. Next firing is scheduled for 4-2-63.

All Systems Vehicle - Tanking test is scheduled for 4-1-63.

2. SATURN V: S-IC - Mod. 1 to Contract NAS8-5608 - Formal negotiations are tentatively scheduled to start the week of 4-15-63.

Specification to standardize the hydraulic unit for all S-IC peculiar GSE stage test and checkout requirements has been prepared and concurred in by affected MSFC elements.

As result of Boeing's presentation on their activation plan of the S-IC portion of MTO, a formal RFQ has been issued through contract channels.

Discussions of the various "work arounds" between P&VE, ME and SAT revealed that the late documentation for thrust structure will cause an approximate 5 weeks schedule impact. Projected delay of test fuel tank delivery is approximately 9 weeks.

P&VE and ME are presently probing the reported 2-3 months delivery delay of propellant feed lines (Arrowhead).

S-II - AF has requested $400,000 of NASA C of F money to modify NAA/SGID Tulsa Facility for the programmed S-II/Apollo workload.

S-IVB - In Vehicle Design Integration Working Group meeting on 3-28-63, DAC was requested to evaluate program impact and initiate propellant tank redesign for approximately 17% increase in LOX and LH_2 pressure, necessitated by the higher J-2 engine NPSH requirements than originally assumed by DAC.

S-IVB/SATURN IB Procurement plan was approved by Headquarters on 3-22-63.

3. APOLLO: MIT Guidance Theory discussions with M-AERO (Dr. Geissler's complaints) will be fully supported by MSC in the future, provided invitations by M-AERO to MIT are properly coordinated with MSC. (This was neglected in last time) MSC and MSFC are sensitive to direct dealings with their contractors.

In the Crew Safety Panel, MSC has postulated automatic abort if two S-1 engines fail based upon the assumption that fire or explosion has occurred. We have some obvious reservations. Reliable explosion sensors are presently not available; immediate sensor development action is recommended for SATURN V.

Awareness Program - Stamp for manned vehicles is under review by M-QUAL and M-SAT. Present conclusion: Stamp should certify stringent qualifications.

4. MISSIONS: Liaison and support to Langley Res. Center's manned space station is continuing. Possibility for fabrication of hardware at MSFC has been discussed but has not been encouraged by LRC. Presentation on subject is being prepared for you. O.K. B

Bonus Payload SA-7 investigation continues. Draft PDP completed 4-1-63.

B 4/4

NOTES 4-1-63 MAUS

1. OMSF SCHEDULES REVIEW - The OMSF Scheduling and Review submission for April is being delivered to OMSF today. The Review to Mr. Holmes will be conducted by OMSF staff in Washington, April 8-9. ✓

2. THIRD QUARTER OMSF PROGRAM REVIEW - Stan Smolensky has informed MSFC that the Quarterly Review will be held at MSFC April 17. ✓ The agenda is as follows:

a. Introductory MSFC Comments ✓
b. Introductory OMSF Comments ✓
c. Project Review
   (1) Saturn I, Saturn IB, Saturn V ✓
   (2) Propulsion, H-1, RL-10, F-1, J-2 ✓
   (3) NOVA ✓
   (4) Launch Vehicle Technology ✓
   (5) Facilities ✓

Also, two action items are on the agenda:

a. Final Reprogramming for FY 63; action: MSFC. ✓
b. Standardized Financial Reporting Form; action: Hq, MLF ✓

We are coordinating MSFC arrangements and presentations for this meeting. ✓

No dry run needed? B yes. 2:00 P.M. 4/12/63.

3. INTERNAL DIVISION AND OFFICE REVIEWS - In continuation of internal division and office reviews, the review of Support Services Office will be April 3, and Research Projects Division, Michoud Operations, and Computation Division will be April 4. ✓

* 4. MTO LH_2 FACILITY - We have been unable to obtain a firm position from headquarters on the LH_2 plant for MTO as they are still studying the problem. (!) Mr. Bass' opinion, at the latest reading, is that he is now recommending the MTO plant as scheduled by MSFC but a 15 or 20 ton/day plant instead of the 30 ton/day plant recommended. He goes along with the 300 tons storage. We are currently analyzing the effect of this compromise with Test Division. ✓

CONFIDENTIAL

NOTES 4-8-63 GORMAN

1. JUPITER MISSILE COMPONENTS: Reference your note of April 6 on this subject, the latest information we have is a TWX from McCall to me received April 4. 1) No additional financial obligations will be assumed beyond those stated in my telegram of March 20. This specified that the cost of providing one C 124 from Italy to Huntsville is $16,833; that packing, crating, and handling of one plane load is approximately 10% of this figure in addition. There are two plane loads involved; therefore, the total commitment is for an estimated $37,000. ✓2) McCall has agreed to store the items in excess of our requirements. This agreement to store does not obligate us for further disposition. ✓3) Storage space required is about 7500 square feet total. We need not provide special environmental control for the items being stored for the Air Force. ✓4) About $1,000,000 worth of special expensive items will be included in the shipments at no additional cost. Note: These special expensive items have been identified only as special type electronic testing equipment. ✓5) Apparently there are additional items that may become available to us at a later date. A list of these is being sent to Marshall for consideration. Additional money for transportation will be required. ✓6) The first plane load arrived at the Redstone Airfield at 2:40 p. m. Sunday. Four nose cones were unloaded and stored in building 7215 under security guard. The second plane load is due today at 2:00 p. m. ✓7) It appears that McCall has this matter under control and although we do not have all the details, I don't think we should confuse the issue by asking a lot of detailed questions at this time; but rather wait until McCall returns for a complete story. In other words, we will take whatever action is indicated on a day-to-day basis until all items being shipped to Marshall are properly stored, accounted for, and protected under appropriate security arrangements. * ✓

2. FY-63 PROCUREMENTS: (Refer to Mrazek's NOTES of 3-25-63 copy attached). I believe we will be able to process the items that are in the procurement pipeline before June 30. There is a more serious problem, however, having to do with in excess of $60 million uncommitted at this time. Eberhard is going to look at this in some detail early this week. We will have a report for the Board Meeting on Friday. ✓

Latest report from Dr. McCall attached. Just received today.
PBG 4/9/63

H G.

Looks like high-pressure gas trailers and compressors are in particularly high demand. Hope we can get some

B 4/13

CONFIDENTIAL

File Notes
4-8-63

April 24, 1963

Dr. von Braun:

Reference attached note from Dr. Geissler and your margin comment. I have talked to Dr. Geissler and assured him that there is no intent ever to require that a position be a supervisory one in order to be graded a GS-13 or higher. I told him, however, that we do need a good statement of the work the man is going to do, his responsibilities, scope of authority, etc., because we have no other means to determine the proper grade under the Civil Service Commission standards and regulations. It is true that we are being more critical in our grading of jobs at GS-13 and above. We need to be sure that we can defend the allocation when audit is made. For example, NASA presently estimates that 30% of positions audited recently were over-graded when compared with CSC standards.

You will recall that not long ago, NASA sent about 18 jobs to the Commission in Washington for GS-16. NASA really thought they were good cases. The Commission disapproved all of them and, in fact, hinted that some of them did not appear to be worth GS-15. That submission was a clear indicator to NASA that to go the supergrade route to the Commission could mean disaster to NASA's executive salary structure.

The Commission, the Bureau of the Budget and the President have all warned Government agency heads to be downright careful when placing a GS-13, 14 or 15 grade on a job. The President believes that since he got Congress to raise the pay last October, and another raise coming up in January 1964, there is no need to over-grade a job to get more money for the position. As you know, the Commission "winked" at over-grading of R&D engineering and scientific jobs in the past but since the new salary act was passed, there is every indication that a real effort to tighten up is going to be launched.

Vic Sorensen

Copy to: Mr. Gorman
Dr. Geissler

INFO COPY, MR. GORMAN

Mr. Sorensen:

See comment to Item 1 directed to your attention by Dr. von Braun.

This item extracted from Dr. Geissler's Weekly NOTES to Dr. von Braun, 4/8/63.

NOTES 4-8-63 GEISSLER B4/13

1. Salary Administration and Manpower Utilization: Reference: March 27 memo from M-DEP-ADM, subject as above. (Copy attached with significant items underlined.) In developing this new grade structure for MSFC, I request your support in having the classification standards interpreted as liberally as possible by Personnel Branch to enable Aeroballistics Division to quickly recruit and commit personnel at GS-13, 14 & 15 levels without first preparing detailed justifications and obtaining formal approvals for each position. It is mandatory for us to have positions available at these grade levels and higher in order to acquire the type of personnel, with specialized experience and stringent educational background, necessary for our theoretical studies.

There has been some indication of a resistance developing on the part of the Personnel Branch to setting up non-supervisory jobs in grades above GS-13. If this should develop into a firm policy our position will be untenable in many key areas. We must have top scientific support of our Branch and Section Chiefs without the necessity of creating artificial supervisory jobs.

Dr. Sc
I agree with Geissler. Your comment is invited.
B

Harry Gorman's letter dated March 27 on Salary Structure does not require with artificial supervisory jobs at GS-13 to retain a basic specialist
B

NOTES 4-1-63 WEIDNER B 4/4

1. F-1 COMBUSTION INSTABILITY: The wagon-wheel injector configuration was tested three times during this period. No combustion instability could be induced with 13.5-grain bombs in the first two tests. Test records show that the injector resisted triggering with this size bomb. The third test was then conducted with a 200-grain bomb which caused high frequency instability that did not attenuate with time.

Dr. Crocco and Dave Harrje will spend one full week, starting today, for us at Rocketdyne reviewing the injector status. Jerry Thomson of the Propulsion and Mechanics Branch, this Division, is their escort.

2. H-1 ENGINE: Two tests were conducted on the Low LOX - Low Fuel Delta-P Full Thrust Injector. During the first test, the injector was bombed once and pulsed twice. The engine recovered to normal operation in all three instances. On the second test, however, the rough combustion cutoff device was triggered by the bomb detonation with subsequent engine shutdown. An inspection of the accelerometer tape indicated that the instability was damping out, but at a relatively slow rate.

3. EXCHANGE OF EXPERIENCE: The three NASA hydrogen engine contractors (Rocketdyne, Pratt and Whitney, and Aerojet) plus Lewis Research Center and our own people sat together last week here at Huntsville to exchange information on hydrogen injector experience. This was done primarily for the sake of the M-1 boys who most certainly will run into their share of problems. The discussion was very constructive and presented kind of a novelty. Pratt and Whitney Aircraft participated but only after going through real soul-searching deliberations. It also came out that Abe Silverstein has instructed his own people to get active again in setting up more intensive longer-range in-house ~~conduction~~ research efforts (very good).

4. SOLID PROPULSION COST REVIEW TEAM: The cost aspects of very large solid motor development and production are of increasing importance for our vehicular study work. For such vehicles procurement of the propulsion elements may represent more than half of the total program cost making this total very sensitive to such data accuracy. Office of Manned Space Flight (Cohen) has requested us to organize a NASA-wide ad hoc team to review the available widely scattered data and to develop more constant cost information for NASA use.

5. S-IV BATTLESHIP TESTING WITH RL10A-3 ENGINES: The sixth hot firing of the S-IV Battleship vehicle using RL10A-3 engines was conducted on 4-23-63 for a duration of 464 seconds. This run was a planned LOX depletion utilizing the actual minimum flight pump inlet pressures. The "Ambient Helium Back-up LOX Tank Pressurization System" was used to pressurize the LOX tank. Helium heater successfully ignited and operated for the complete duration. Latest reports indicate that one more long duration test was run thereafter successfully with helium heater O.K.

B 4/4

NOTES 4-1-63 Stuhlinger

1. DIRECTOR'S REVIEW: On my NOTES of 2-25-63 (Attachment #1) you asked for a briefing on RPD's housing situation. This topic, as well as others pertaining to RPD's organization and activities, will be presented in our Director's Review presentation, scheduled for this Thursday, April 4, 9:00 a.m. in your conference room. Do you plan to attend any or all of the Review, or would you prefer a separate briefing on our housing situation? ACTION REQUIRED.

↑ Eberhard (that transpired 2 1 on at GSFC on 4/4. B

2. LLS PAYLOADS: RPD personnel are working closely with the Special Assignments Office on the LLS Payload Project. A number of working groups have been established by the Special Assignments Office, and RPD is represented on several. Our efforts in establishing the criteria for the conceptual designs of shelters and roving vehicles during the last few months are providing excellent background for the current activities. Also, our work over the past years on the characteristics of the lunar surface should prove to be of great value to the LLS Payload Project.

3. FY-63 SUPPORTING RESEARCH AND TECHNOLOGY PROGRAM: In the FY-63 OART Program, we were authorized $6,509,500; $5,971,000 has been committed to date. In the OMSF Technology Program, we were authorized $6,050,000; $4,784,000 has been committed to date. In the Saturn V Technology Program, we were authorized $3,800,000; $3,599,000 has been committed to date. In the OSS Program, we were authorized $400,000; $400,000 has been committed to date.

Last week a teletype was sent from OART giving Marshall the authority to reprogram funds up to $20,000 within an OART Program from one subprogram to another. This will assist greatly in finalizing contract actions.

E.S. We told Helen 4070 didn't we? B

4. METEOROID MEASUREMENT PROJECT: It now appears that only about 2700 lbs. payload (Meteoroid Measurement Capsule and Service Module modifications) can be placed into 400-1200 KM orbit. P&VE Division is looking into the possibilities of adding propellant and reducing residuals in the S-I stage, which should gain approximately 1200 lbs. in payload weight. However, the Instrument Unit and the S-IV stage have increased in weight, which will cut down on the payload capability. This information should not be made available to Fairchild at this time.

22, 11 B

Mr. Bob Pace, Project Engineer, has been accepted by MIT for the 1963-64 Sloan Fellowship Program starting in June.

* 5. APPLICATIONS PROGRAM: Members of the Applications Office visited Indiana University last week. The University has a $150,000 contract from NASA to help implement the Applications Program. The first item which Indiana University plans to disseminate is the soldering manual developed by the MSFC Quality Assurance Division. We furnished a master copy from which the University may reproduce as many copies as required.

6. SPEECHES IN GERMANY: I was asked by the German Physical Society, and by the German Rocket Society (Mr. Staats) to give several talks in Germany this fall. Activities of this kind always require an appraisal of their priorities relative to priorities of activities related to any work at MSFC. What significance, in principle, should be attributed to speaking activities abroad? ACTION REQUIRED.

With judicious moderation, yes! B

(Tie-in of Franklin always necessary, if talks held on 7-04)

Attach #1 NOTES 2-25-63

NOTES 4-1-63 MRAZEK

B 4/4

1. NASA DESIGN CRITERIA STEERING COMMITTEE: The first draft of general guidelines in the environment and structures area will be ready for review by Centers in 7-63. The subcommittes on propulsion and especially stability guidance and control still suffer from too little Center support (not only MSFC). The latter committee deals in a difficult, vast area where traditionally everything is in a state of flux and only very general approaches can be categorized. Mr. Kroh will need more support in the Astrionics Division. The deadline for first drafts is 10-63. All of our MSFC people have worked hard, mostly after hours and at home, and Dr. Bisplinghoff acknowledges this gratefully.

G. Haussmann. Please help B

2. STUDY OF REUSABLE SPACE VEHICLES: North American Aviation, Inc. (NAA--S&ID) will add $249,000 of their own money to a $250,000 government (non-profit) contract. Lockheed (California) will add $80,000 of their own money to a $349,000 government (non-profit) contract.

H.H. Koelle How do you tie into these studies? B

* 3. COST OF LARGE SOLID MOTORS: A study has been initiated to determine more realistic cost estimates for large solid propellant motors. Preliminary analysis indicates that a realistic cost for large solids will be somewhere between $2.00 and $2.30 per pound of motor weight. This includes thrust vector control nozzle, activating mechanism, and transportation to the launch site.

* 4. GEORGIA NUCLEAR LABORATORY: The Atomic Energy Commission's (AEC) operating license expires 4-4-63 with the Air Force lease. General Services Administration will pick up the lease, but doesn't want to apply for the license. All that is required to extend the license is for the facility "owner" to apply. The Air Force, Corps of Engineers (agents for the Air Force), General Services Administration, and AEC all refuse to apply for the license as owner. A meeting was held 3-29-63 in Washington to try to straighten this out. If not successful, Lockheed must start on 4-2-63 to disassemble the reactor for storage.

5. SEAMANS' BRIEFING: The briefing reported on 3-25-63 will be postponed until after the scheduled meeting between you and Harry Finger on 4-22-63.

* 6. MECHANICAL DESIGN INTEGRATION WORKING GROUP: The Mechanical Design Integration Working Group held a meeting with North American Aviation, Inc. (S&ID) and Douglas Aircraft Company on J-2 engine performance, insulation, stratification, recirculation and pressurization problems. To assure safe flight of the early vehicles, changes to the S-II and S-IVB stages are required. The contractors have been directed to proceed with these and to assure that most or all of the additions can be removed after the first three or four flights and/or when better test data are available. Action items from the meeting are shown in attachments #1 and #2.

P&VE NPSH a little better than expected, eh? B

Attachment #1: Memo No. M-P&VE-VH-137
Attachment #2: Memo No. M-P&VE-VH-142

Cy sent to ...
Rees, Bannon, Mauer
4-7-63

NOTES TO HOLMES - 4/9/63 - DEBUS

1. Kelly Committee Visit: The group was briefed according to our planned agenda and itinerary. I trust that you were briefed on their findings.

2. Crawler-Transporters for LC-39: The contract for the design, development, fabrication and erection of two crawler-transporters for LC-39 was signed March 25th. Target date for completion of all work under the contract is June 1, 1965. Total contract cost is $6,998,763. Preliminary layouts were made (in-house) for the proposed relocation of the control cabs for the crawler-transporters in connection with the design criteria. The production of a 1/48 scale model crawler-transporter was begun by Graphic Engineering and Model Studies Branch, MSFC for LOC. Completion of the model is scheduled for mid-May 1963.

3. Hot Tests of Model LC-39: Test Division, MSFC, has completed the first phase of the lift-off tests, using a 1/56 scale model Launcher-Umbilical Tower, pad area, deflector, and Saturn V engine cluster. The tests yielded very good data. Modifications were introduced based on the test results and we will continue testing on the model through June 1963.

4. SA-4 Acoustic Tests: Acoustic pickup at the test panel built for vibration tests during SA-4 launch suffered no damage despite measured 130/140 db acoustic level.

5. Centaur-Agena Programs: Preliminary meetings were held with GSFC PIO on information procedures at Cape for Centaur and Agena launches. Agreement reached that LOC PIO will be spokesman for these flights at Cape Canaveral (per "Basic Operating Concepts" document). This will be coordinated also with Lewis.

6. TV Study: A TV study group of LOC/Headquarters (Haney) has been established to determine if requirements exist for NASA to have its own television coverage capability at Cape Canaveral (i.e. a mobile TV unit) to respond to PIO, educational and technical-management needs.

#11

NOTES 4/8 63 CONSTAN B4/13

1. POTENTIAL STRIKE OF INTERNATIONAL ASSOCIATION OF MACHINISTS (BOEING)

The union members of the International Association of Machinists voted against accepting the Boeing union contract offer. The present 80 day cooling off period ends at midnight April 14 and it is possible that there may be a strike of the IAM members at Michoud Operations on Monday April 15, 1963. There are 185 people employed by the Boeing Company at Michoud Operations who are members of the IAM. The Boeing Company is presently preparing an impact evaluation for our information.

2. EASEMENT FOR UTILITY COMPANY

The negotiations have been held with the New Orleans Public Services Inc. (a commercial company providing utility services in the New Orleans area) for an easement on NASA Michoud Operations property to construct an electrical subswitching station. The subswitching station will provide the Michoud Operations with two sources of electrical power and reduce the possibility of a long electrical outage.

3. ENGINEERING AND OFFICE BUILDING DESIGN

Design is continuing satisfactorily by the August Perez and Associates for the 500,000 sq. ft. engineering and office building to be constructed at Michoud Operations.

4. CLAIM AGAINST THE NASA

In January an iron worker employed by the Welding and Manufacturing Company, Inc. fell about 40 ft. to the concrete floor of the manufacturing building at Michoud Operations. The Welding and Manufacturing Co., Inc. was awarded a prime contract by the NASA to modify roof trusses in the Chrysler area. The claim indicates that the accident and resulting personal injury was caused directly by the neglience of agents and employees of the NASA. This matter has been referred to the Procurement and Contracts Office for appropriate action. There is no basis to substantiate the claim that agents or employees of the NASA were negligent.

NOTES 4-8-63 FORTUNE B4/13

1. A SPEECH A DAY: Public speaking demands upon MTO personnel were increasingly heavy last week; we averaged a speech a day. Fortunately, we have several good speakers so that no one individual was overloaded. Worthwile! B

2. MEETING WITH GOVERNOR BARNETT: The Mississippi State A&I Board thought it more important that I meet with the Governor Thursday morning, than with them. A television and newspaper-covered conference resulted, in which I discussed present plans for construction and operation, plus anticipated ground breaking 15 May. The Governor invited B. U. Jones and myself to luncheon at his mansion, which we accepted. He proudly described it as the oldest governor's mansion in the South, the last to be modernized, and the only one with a gold-plated bathroom. !

3. APPOINTMENT WITH SENATOR STENNIS: As mentioned before, to show no apparent favoritism to either side, I gave equal time to Marx Huff, Senator Stennis's Assistant and to Senator Eastland's Aide, Mr. Buckley. I have an appointment with the Senator at 9:45, Thursday morning, 11 April, in Washington to describe the current status of Mississippi Test Operations, and check his 15 May availability. Slattery and I have begun to draw up plans for this and hope you can review a proposed program within a week or so.

4. MEETING WITH COAST ELECTRIC PERSONNEL: Mr. Shattuck discussed the offers made by the Corps of Engineers and his counter proposals. MDO has offered a different formula for his power lines than was afforded the land owners. I intend to discuss this with the MTF Working Group and our legal personnel to see if a more equitable agreement can be reached. Both aforementioned Senator's Assistants have indicated they will support Shattuck if he has to take it to the U.S. Court of Claims, which would cost both sides much time and money. Mr. Shattuck will not release a previously proposed inflamatory news release to his eight-thousand stock-holders, until he has had more chance to work this out with the Corps of Engineers. An indignation meeting, also proposed, will not be held for some time, either. Of great concern to our personnel at MTO was the possibility that some of the malcontented shareholders might set more fires; we have enough trouble with this now.

W.F. I'm glad you succeeded in putting out this fire, — at least temporarily. Such things could hurt us badly! B

NOTES 4-8-63 GEISSLER B 4/13

1. Salary Administration and Manpower Utilization: Reference: March 27 memo from M-DEP-ADM, subject as above. (Copy attached with significant items underlined.) In developing this new grade structure for MSFC, I request your support in having the classification standards interpreted as liberally as possible by Personnel Branch to enable Aeroballistics Division to quickly recruit and commit personnel at GS-13, 14 & 15 levels without first preparing detailed justifications and obtaining formal approvals for each position. It is mandatory for us to have positions available at these grade levels and higher in order to acquire the type of personnel, with specialized experience and stringent educational background, necessary for our theoretical studies.

There has been some indication of a resistance developing on the part of the Personnel Branch to setting up non-supervisory jobs in grades above GS-13. If this should develop into a firm policy our position will be untenable in many key areas. We must have top scientific support of our Branch and Section Chiefs without the necessity of creating artificial supervisory jobs. ✓

Vic Sr I agree with Geissler. Your comment is invited B

Harry Gorman's letter dated March 27 on Salary Structure does not require such artificial supervisory jobs at all to rate a true specialist B 1/30

2. Saturn IB Fin Requirement: Results of recent control and abort analyses of manned Saturn IB vehicles indicate that the gimbal capability of the Saturn IB booster would be marginal without the 121 ft^2 fins. The fins would increase the divergence time in case of control failure by a factor of 2. Due to the above factors and uncertainties of future IB configurations, Aeroballistics recommends either that we fly with fins on present booster, or that the eight stubs be redesigned to provide the equivalent stability of the present four finned vehicle. The first alternative would cost approximately 300# payload. The second alternative would not increase structural weight of the booster compared to the present configuration with the 8 stubs, thereby incurring no payload loss. ✓ What's P&VE's position? B

3. Apollo Reference Trajectory Seminar: On April 3, a seminar was conducted by Aeroballistics Division about studies concerning lunar trajectories and pertinent techniques for the benefit of people from other organizations who will participate in the Apollo Reference Trajectory Working Group. An agenda and list of participants are attached. All major organizations involved except MSC (which was also invited) attended. Our presentations were well received, and triggered, in some cases, lively discussions. It is my impression that we are ahead of all other parties with respect to overall grasp of problems and availability of systematic tools. Some comments from the JPL representative indicated a lack of appreciation of the complex constraints resulting from the LOR scheme. The absence of MSC - the major partner - is indicative of their reluctance to go into unreserved cooperation - they are still dragging their feet concerning the proposed panel or sub-panel for producing inputs to the Apollo Reference Trajectory Working Group. This week we are making another attempt to straighten this out, on the occasion of the next Apollo Reference Trajectory Working Group meeting (with Hq participation) which will take place at Houston (April 10). ✓ The job to be done is very complex and we are still far away from a complete grasp of problems. This explains the concern of Dr. Shea's people. I hope we will be able to work satisfactorily under the very complex organizational structure - much of this will depend on the attitude of MSC. ✓

E.F. Team up with Shea and you'll win this one B

NOTES 4-8-63 GRAU

B 4/13

1. NASA-WIDE QUALITY ASSURANCE MEETING IN WASHINGTON, D. C.: Together with some representatives of MSFC Project Offices and the Quality Assurance Division, I participated in the 2nd NASA-Wide Quality Assurance Meeting in Washington, D. C. on March 26 and 27 where the various Centers exchanged experience in the implementation of the NASA Quality Publication NPC 200-1, -2, -3 and related subjects. Progress has been made in all places since the first meeting which took place in June 1962. MSFC, Lewis Research Center, and Langley Research Center have taken the cleanest and most straightforward approaches, others made more or less vigorous efforts to follow the established lines. Goddard Space Flight Center has taken a rather compromising approach, was heavily criticized, and was asked to reorient its thinking considerably. I particularly emphasized the necessity to establish a central point of responsibility and authority in the field of quality assurance in those Centers where it does not exist yet, with priority #1 given to MSC. There Dr. Gilruth makes wonderful speeches about the importance of reliability and quality, and some quality people located low in the organization try to implement something; but the latter ones are constantly blocked or overruled by the Project Offices which do not receive uniform guidance and direction. We have expended considerable effort in NAA, Downey, to synchronize the approaches of MSFC on the S-II program with MSC in the Apollo program, but progress is too slow. Mr. Koppenhaver (Office of Reliability and Quality Assurance), who conducted the meeting, promised to take the problem up with Dr. Seamans, while Mr. O'Neal's office in Dr. Shea's organizations will present it to Mr. Holmes. I hope to get some action this way. I would appreciate your tooting into the same horn if you should be asked about your opinion on the subject. ✓

B 1

2. SA-5 VEHICLE STATUS: Difficulties with SA-5 resulting from the first and second duration static test now impose a problem with regard to schedule. However, it is felt that, of the ten days to be made up in the schedule, seven can be gained by running a seven day post-static checkout operation. At any rate, this is the course we will follow to recoup as much of the time lost in the re-firing as possible.

The major uncertainty in make-up of time during post static has to do with the volume of rework scheduled to be done by Manufacturing Engineering Division concurrent with this final checkout. ✓

B 4/13

NOTES 4-8-63 GRUENE

1. Micrometeoroid Satellite: A successful meeting was held on 4-5 April with Fairchild personnel and Mr. Pace in attendance, to discuss Micrometeoroid requirements at the Cape.

2. Crawler-Transporter for LC 39: The contract for delivery of two crawlers was let on March 25. The work should be completed by June 1, 1965.

3. SA-4: During SA-4 firing, simulated building walls with window panes were installed close to the pad area. Acoustic pickup at the structures indicated up to 143 db. No glass breakage was noted.

B 4/13

NOTES-4/8/63-HAEUSSERMANN

W.H. Request a 1-page summary on the tech. aspects and background of this B

1. MECHANICAL FEEDBACK SERVO ACTUATOR DEVELOPMENT FOR S-2: Meeting was held between M-SAT, M-P&VE and M-ASTR in which terminology of direction to S&ID was agreed upon. Direction to proceed was effective 4/5. ✓

2. UNIVERSAL ENGINE LOAD SIMULATOR: M-SAT has been requested to direct DAC to conduct an evaluation of the AMF Universal engine load simulator (being obtained for F-1 studies) to determine if it is feasible for use as a J-2 load simulator in their S-IVB servo actuator development. ✓

3. RCA 110 MONITORING OF PROPELLANT LOADING: LOC personnel were under the impression that the RCA 110 would monitor encoders during SA-5 launch preparations. This cannot be done. An attempt will be made to accomplish some monitoring during the wet test. ✓

4. SATURN I BREADBOARD FACILITY: A Saturn 1 S-1 stage computer program has been written and several runs made with the automatic breadboard equipment. MSFC groups who are to make later use of this equipment have been observing these checkout runs. ✓

5. INSTRUMENTATION WORKING GROUP: Meeting was held 4/3 with representatives of M-RP and Fairchild regarding micrometeoroid capsule for SA-8 and 9. Interface problems were discussed and capsule requirements for the IU telemetry were presented. Action items established: (a) MSFC to study radio frequency interference (RFI) incorporating capsule frequencies. (b) Measuring and telemetry requirements for IU to be finalized by 4/17/63. (c) Trajectory information required by M-ASTR-I for antenna design and location considerations. ✓

6. AIR FORCE CHARGES REGARDING DUPLICATION OF FACILITIES: Comments to the Air Force memorandum were prepared and forwarded to FEO for TWX to Holmes' office, 4/6. Copy of comments attached. (Enc. 1) ✓

W.H. → Dr. Dryden's comments to these silly accusations are a classic. Use the same line when questioned! B

1 Enc:
Comments to AF memo

NOTES 4/8/63 HEIMBURG B 4/13

1. MTF: RFQ package, including criteria and funding authorization for MTF technical systems, being held in readiness by M-P&C pending receipt of NASA Headquarters approval. Procurement plan for MTF cryogenics submitted by M-P&C to NASA Headquarters as reported in our last week's NOTES is held in abeyance pending meeting scheduled, 4/11/63, at Capt. Frietag level with MSFC representatives to resolve basic difference of opinion on projected size of LH_2 plant; MSFC recommends 30 tons/day - Headquarters is suggesting 20 tons/day. We are going to maintain our present position. Data-Fax system has been installed and placed in operation, linking MSFC (MTF Working Group at present time) and the MTO Office at the site. Also, the system temporarily ties in the Mobile District Corps of Engineers, and Sverdrup & Parcel, Huntsville Office. ✓

B 4/13 2. MARINE ACTIVITIES: Barge PROMISE with SA-D5 aboard making good time and expected to arrive New Orleans, Louisiana, 2:00 a.m., 4/9/63. ✓

3. ADVANCED DYNAMIC TEST FACILITY (SATURN V): Greenhut Construction Company has started construction on the Advanced Dynamic Test Facility. ✓

4. S-IV SACTO, DAC: BATTLESHIP - Next firing scheduled for Wed., 4/10/63. Cutoff at 31 seconds of intended full duration firing, Tue., 4/2/63, caused by fire at engine position 2. Fire caused by leak at engine, hydrogen line boss. (Possible human error; wrong cap installed.) ALL SYSTEMS - First propellant loading attempted Mon., 4/1/63. Leakage at LOX fill connection caused test postponement (only 1½% of LOX tank volume filled). Fill connection used was vehicle part which had not been updated on basis of latest improvements. LH_2 connections same condition. These connections are of type that MSFC testing had proved to be bad. Improvements had not caught up with All-Systems hardware. This leakage cracked beam on vehicle load ring. Damage is quickly repairable. Next loading attempt due today or tomorrow with proper facility precautions. B 4/13 S-IV-5 PREPARATION:- GSE and other hardware continue to slow progress in this area. It is felt that a major factor may be the continued over-emphasis on getting off battleship tests. From what we can determine, DAC has not made maximum utilization of their experienced battleship people to get ready for All-Systems and S-IV-5 testing. We recommend DAC be instructed to de-emphasize battleship and concentrate on All-Systems and S-IV-5. Pregnant Guppy basically still on schedule; first test flight planned end of April or beginning of May. ✓

K. H.

What's latest status of acquisition of Cuban ferry boat? Please answer in next Notes. B 4/13

B 4/13

NOTES 4-8-63 HOELZER

No report.

NOTES 4-8-63 HUETER B 4/13

1. AGENA: No further participation by MSFC in the Agena Program is anticipated. Dr. Himmell, the Lewis Agena Project Manager, is preparing a letter stating that MSFC has fulfilled its requirements relative to the Agena transfer. Mr. Duerr is preparing a summary of the transfer activities similar to that prepared for the Centaur Program. This will be submitted to you within the next few weeks. ✓

2. LUNAR PAYLOADS: We presented to Mr. Taylor, OMSF, on April 2, the results of our planning, budgeting and scheduling efforts in conformance with the program guidelines submitted by his office. The presentation was apparently well received. It was agreed that the next exercise would be for MSFC to prepare synopses covering those study efforts which it was felt should be commenced immediately and for which FY 63 funding would be required. These synopses were prepared and handcarried to Washington on April 7. The total dollar value represented by the proposed studies is 1.72 million. It is anticipated that this funding level will support any FY 63 effort and the first quarter of FY 64. The following schedule was established relative to activities pertaining to the study areas:

a. By April 5: MSFC to submit task descriptions to OMSF in the prescribed format. (Submitted). ✓

b. By April 12: OMSF to review task descriptions and furnish comments to MSFC; OMSF to submit resulting package to Associate Administrator for approval. ✓

c. By April 19: MSFC to submit work statements to OMSF.

d. By April 26: OMSF to authorize MSFC to proceed with approved study contract actions.

e. By May 1: MSFC to issue RFP's for approved studies.

f. By June 30: MSFC to sign contracts for approved studies. ✓

3. HYLASTAR: Space General presented on April 4 their unsolicited Hylastar proposal. The essence of their new program is to prove the Hylastar propulsion system in a test program where the key components would be flight prototype hardware sized for application with a 3rd stage Saturn 1B. Included are: (1) Propulsion system functional demonstration, (2) Evaluation of feed system design criteria, (3) Thrust chamber technology advancement, (4) Prototype propulsion system demonstration.

The proposed program would, according to Space General, cost about 8 million dollars and require approximately 22 months. Expenditures in the first year were estimated at about 6 million. The proposed schedule looks tight to me in that no time is allowed for setbacks. MSFC, and in particular P&VE Division, is currently evaluating the proposal. We should be able, by the end of this month, to submit a recommendation to you relative to further action. ✓

NOTES 4-8-63 Koelle B 4/13

1. NOVA REDIRECTION

As a result of our discussion (Wednesday, April 4) and your directives, we are now reorienting our study efforts in the direction of unconventional reusable NOVA concepts. We will issue new guidelines to the contractors this week along the following lines:

A. Sixty percent or more of the total study effort will be applied in the area of operations analysis and conceptual design leading to and approaching the greatest practical extent of an "ideal NOVA" defined ~~as follows~~:

(1) NOVA must have a multiple mission capability, preferably in all of the following areas:

(a) Earth to low orbit heavy cargo delivery,

(b) Earth to orbit cargo delivery in connection with dog-legging into high orbit inclinations and/or interorbital transfer to high altitude orbits,

(c) Global logistic transport for cargo and personnel,

(d) Lunar logistic transport for mixed cargo and personnel,

(e) Planetary logistic for cargo and/or personnel,

(f) High velocity space probes.

(2) The "ideal" NOVA concept might have most of the following features (or equivalent):

(a) Single stage (with air augmentation, and/or tank staging and JATO),

(b) Land and sea recovery (with payload in case of global transport),

(c) Design lifetime of 100 flights,

(d) Terminal guidance,

(e) Wide payload range capability (larger than SATURN V up to approximately 500 tons to low orbit),

(f) Acceptable acceleration limits in case of personnel transport,

(g) Compatibility with nuclear upper stages.

B. The rest of the effort will be used to up-date conventional expendable or partially reusable NOVA vehicles, in the latter case with first stage recovery as a minimum goal. This data will be used to evaluate the advantages offered (and price to be paid!) by the various "ideal NOVA's" we hope to come up with.

H.H.K. DOES THIS FORMULA INTERPRET YOUR INSTRUCTIONS CLOSE ENOUGH SO THAT WE CAN PROCEED?

→ Precisely. You may proceed on this basis. Capt. Freitag also agrees. Make sure to get Shea on board also (through Doug Lord)! B 4/13

NOTES 4/8/63 KUERS

B 4/13

1. Saturn V, S-IC Stage: Delays in the S-IC Structures are apparent as follows:

a. Upper Fuel Test Container bulkhead approximately 5 weeks late. The following factors contributed to this delay: debugging and modification of gore trim fixture and meridian weld fixture; breakdown of Linde welding equipment for outlet fitting weld station; modification of meridian weld fixture for incorporation of support for improvised X-ray inspection procedure; manhole outlet fitting not delivered by Boeing; dye penetrant inspection requirements established too late. ✓

b. Lower Fuel Test Container bulkhead approximately 5 weeks late. Reasons for delay: documentation delay of several weeks; development of forming technique of sculptured segments at Wichita not yet successful leading to the decisions of using explosively formed apex segments from Ryan and unsculptured base segments from Wichita; both parts presently being chemically milled by Ryan. ✓

c. Skin segments approximately 3 weeks late. The welding fixture for joining of skin panels has arrived and is presently being erected in Building 4707. However, skin panels are late because of late documentation and forming problems (rounding) at Wichita. ✓

d. Thrust structure is between 5 and 7 weeks in delay mainly because of documentation and procurement of long lead time items by Boeing. ✓

e. Hydrostatic test facility is on schedule. ✓

f. High bay facility at Michoud is approximately 3 weeks in delay according to my information. ✓

It is my opinion that most of these delays are inherent in any development program and could not have been foreseen. If we had worked with less optimistic schedules some problem areas might only been detected at a later time. It is doubtful whether we can catch up on these delays. As soon as the major problems have been solved and parts start to flow in we will go to a second shift operation. ✓

139 2. Saturn I, S-I Stage: SA-9 Tail Section has been completed in structural shop 4 weeks ahead of schedule. This was the last one being manufactured in-house. ✓

B 4/13

Notes 4-8-64 Lange

1. SATURN I: S-IV All Systems Vehicle - Cold flow test is scheduled for 4-8-63. ✓

S-IV-5 - Shipment to SACTO is scheduled for night of 4-15-63. ✓
S-I-5 - Progress on schedule will be reviewed today. It appears that 8-10 days can be taken off from the time remaining. ✓

2. SATURN V: S-IC - Following construction contracts have been approved: a) Tank Farm & Piping - Hydrostatic Test and Cleaning Facility, b) Special Tooling Foundation in Minor Assembly Facility. ✓

Boeing requested $181,175 for additional special interim facilities needed to support the Plan V schedule. Since Michoud operation concurrs in the request, M-SAT will provide the funds. ✓

Boeing has requested funding in excess of $600,000 to provide Dye Penetrant Inspection Facilities at the Wichita Plant. P&VE is presently investigating the requirements for Dye Penetrant Tests. ✓

O.L. If I understand situation right, this is a most critical bottleneck due to irresolute planning by Arrowhead! Urgent action required! B

Re Propellant Feed Lines (Arrowhead) - Attachment 1 - Joint P&VE, ME and M-SAT investigation indicates requirement to establish a backup source to the Arrowhead effort. Procurement requests have been processed to P&C to establish Flexonics as the backup source for both development and hardware procurement. This requirement establishes an additional funding burden in FY-63 and FY-64. ✓

S-II - A decision was made that mechanical feedback be adopted for the production servoactuator instead of the present electrical feedback system. To provide system backup and electrical position indication for telemetry, a potentiometer feedback system will also be incorporated. The decision on the hydraulic lock valve, thermal relief valve and accumulator size cannot be determined until more information is obtained on the dual plane-separation system, suction duct and heat shield loads and J-2 engine loads. It is expected that enough information will be available to firm up these decisions by 5-15-63. ✓

The S-II Electrical Checkout Phase I (concept) Review will be held on 4-9-63, at MSFC to review the automatic checkout electrical support equipment. ✓

S&ID has been directed to submit to MSFC the cost and justification for rearrangement of equipment related to S-II at the AF Plant #3 at Tulsa. ✓

Blast hazard test program is expected to be underway by 5-1-63. Order has been placed with White Sands Missile Range by P&C. ✓

Instrument Unit - The P&C (Mr. Davis) suggestion that DAC buy the TM equipment from the same source as MSFC will be discussed on 4-10-63 at MSFC. ✓

3. APOLLO: Mr. Frick's resignation is said to be effective 4-25-63. Piland will be acting APOLLO Chief. Dr. Weyers has also resigned. No replacement announced. ✓ Rumors are that Chamberlin, former Gemini Chief, may leave too. ✓

New Interface Panel (Mission Control Operations Panel) was formed during meeting 4-5-63 in Houston. Dr. Speer is our Chairman. ✓

APOLLO Boiler Plate #9 is due to arrive today and will be delivered to M-TEST pending initiation of dynamic test in May. ✓

B 4/13

NOTES 4-8-63 MAUS

*1. MTO LH_2 FACILITY - Chris Andressen, Rod Walker, and representatives of M-TEST, M-SAT, and M-P&C will be in OMSF Thursday, April 11 for discussions with Capt. Freitag and Abe Bass on the procurement plan for the Liquid Hydrogen Plant near Mississippi Test Operations. ✓

*2. BREAKDOWN OF AIR FORCE LH_2 PLANT - Air Force Plant 74 at West Palm Beach broke down at 10:00 p.m. last night, due to leak in cold box. It is expected to be down about 10 days. In storage: 57,000 lbs, which is about 3 days usage at Pratt & Whitney. We expect to have 8 trailers and 3 railcar loads en route from California today. ✓

3. QUARTERLY OMSF PROGRAM REVIEW - Reference your comment on my 4-1-63 NOTES (copy attached), the dry run for the April 17 Fourth Quarter OMSF Program Review is scheduled for 2:00 p.m. April 15. ✓

4. OMSF SYSTEMS REVIEW MEETING - The Third Systems Review Meeting, scheduled for April 25 in Washington, has the following agenda items:

Cancelled! B 4/13

Apollo Information Flow
Apollo Specification Tree
Saturn V Re-entry Trajectories (SA-504 and SA-505); this item will be included if time permits, and will be presented by MSFC's Areo Div.

Preliminary discussions today with Dr. Turnock (Mr. Gautraud's office) revealed strong reasons for postponing the agenda item on Apollo Information Flow, pending findings of Dr. Speer's Mission Information Panel. Since this was to have been the major topic, we (in cooperation with Dr. Speer) are preparing a teletype to Dr. Shea requesting postponement of the entire meeting. *copy on left side of folder. BBS

Dr. Turnock indicated that he will support our request for postponement of the meeting. ✓

If the meeting is not postponed, we plan to hold an agenda review at 1:30 p.m. April 19 ✓

Attachment:
NOTES 4-1-63 MAUS

B 4/13

NOTES 4-8-63 MRAZEK

1. SEAMANS' BRIEFING: The RIFT presentation to Dr. Seamans has been scheduled for 4-25-63. Harry Finger still plans to visit MSFC on 4-22-63 for pre-briefing discussions.

2. GEORGIA NUCLEAR LABORATORY: The Georgia Nuclear Laboratory operating license was extended by the AEC (Atomic Energy Commission) for an unspecified period of time to allow further time for resolution of ownership problem by AEC, Air Force, Corps of Engineers, NASA, and the General Services Administration.

3. DUAL INSTRUMENT UNIT PROPOSAL, SATURN IB: The operational and R&D instrumentation requirements for Vehicle SA-201, as submitted from the Astrionics Division, exceed the available mounting area in the SATURN IB IU (Instrument Unit). The structural design of the IU is so far advanced that a redesign for an elongated IU would endanger the schedule. Therefore, it is proposed to fly two instrument units in the R&D version of the SATURN IB; one equipped with the operational instrumentation; the second one, on top of the first, equipped with the R&D instrumentation. This second IU could be eliminated when the SATURN IB becomes operational.

4. PRELIMINARY FLIGHT RESULTS, SA-4: The SATURN SA-4 flight base region thermal environment appears to have been approximately the same, or slightly less severe, than that encountered during the SA-1, 2, and 3 flights. The base region external gas temperatures appear to have reached a slightly lower maximum than that measured during the previous flights. The skin temperature measurements of the backside of the heatshield indicated no excessive temperature rise; however, the measurement in back of the M-31 insulated panel did indicate the maximum (120°F).

The thermal environment of the flameshield region appears to agree with the previous flights until engine #5 cutoff. The pressure measurement in this region did show a drop at 100 seconds, as expected, corresponding to engine #5 cutoff. The temperature of the flameshield calorimeter shows an increase after engine #5 cutoff indicating that the heating rates to the flameshield increased during this time.

Two skin temperature measurements attached to one of the uninsulated outboard engine shrouds reached maximum temperatures of 960°F, approximately two times that measured during previous flights. This was expected since the analytical studies indicated temperatures of 1200°F, which is acceptable for the steel shroud.

Other temperature measurements in the base region appear to be as expected.

5. ACOUSTICAL FLIGHT DATA: For preliminary acoustic flight data see attachment #1. Stations 1012 - 1029 are where the S-I-5 spider beam, retro-rocket and I-Beam fairings and hydrogen ducting were simulated.

6. S-IV ACTIVITIES: To assure ourselves once more of the status and to uncover eventual shortcomings of the S-IV/SA-5 flight stage prior to static firing, this Division is sending an ad hoc group of four or five people to Sacramento immediately. Observers for the first all-systems cryogenic loading test are leaving today for Sacramento.

Attachment #1: Memo From M-P&VE-S

1/3 f

W.M. Do you expect me to be present? I could if necessary. B

W.M. Sounds like a good idea! B

(No aero-dynamic, structural or control hitches? GSE?)

1/2 f

GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

Memorandum

TO Dr. W. A. Mrazek, M-P&VE-DIR DATE April 5, 1963

FROM Chief, Structures Branch, M-P&VE-S

SUBJECT Weekly Highlight

SA-4 Acoustic Data

Preliminary analysis of SA-4 data indicated that the maximum acoustic environment occurred in flight rather than lift-off, at stations 1029 and 1012. The maximum sound pressure level in flight was approximately 160 db at both locations; however, this level occurred at 74 seconds at station 1029, and 76 seconds at station 1012. This time difference indicates the formation of an unattached shock wave ahead of station 1029. As the mach number increases, this shock wave travels aft until it becomes attached. The boundary layer turbulence, which is developed behind the traveling shock wave, is proportional to the intensity of the sound pressure level; consequently, as the shock wave moves aft, the maximum intensity recorded by the transducer at station 1029 would be expected earlier than at station 1012. This phenomena is an indication of what had been anticipated but not verified. These relatively high levels are largely dependent on actual locations on the vehicle.

This phenomena was not apparent in the SA-2 flight data taken from a flush mounted microphone at station 1200. The maximum level of approximately 149 db occurred on pad, and a level of 148 db was recorded in flight at 59 seconds.

The acoustic data obtained from flight wind tunnel and static test are currently being used to determine the dynamic response of the structure and to provide design criteria. The future use of payloads such as the Apollo configuration will increase the probability of occurrence of the undesirable quasi boundary layer noise phenomena. The time the structure is subjected to the high noise level caused by the turbulence behind the unattached shock wave is relatively lengthy; hence, the possibility of structural fatigue may occur.

1, B

K.M.

Maybe we'll have to re-open that old argument with MSC again re use of a shroud on the escape rocket tower! B

Attachment #1

MSFC - Form 488 (August 1960)

SUBJECT: Weekly Highlight April 5, 1963

Structures Branch has initiated studies to determine the structural adequacy of the vehicle for this environment; additional flight instrumentation will be used to better define this dynamic environment.

G. A. Kroll

Copy to:
Mr. Rieger, M-P&VE-PC

NOTES 4/8/63 Rudolph B 4/13

No Notes

B4/13

NOTES 4-8-63 WEIDNER

1. RL10 ENGINE: Five more RL10 engine firings, starting at about ambient conditions, without the use of an ejector or a steam evacuation system have been conducted. To date, RL10 engines have undergone over 2,500 firings for a total accumulated duration of 115 hours. At present, ten test positions are being utilized for various engine tests. Production deliveries for the RL10 engine are on schedule.

2. J-2 ENGINE: Seven tests were attempted and prematurely terminated this week. Termination was mainly caused by lack of ignition detection, which was later found to be erroneous. Corrective action on detection circuitry is being taken.

3. J-2 ENGINE NPSH (NET POSITIVE SUCTION HEAD): Steps have been taken in the J-2 development program to introduce improved pump inducer designs on both sides (LOX and hydrogen), which most assuredly will give us reduced NPSH requirements. Enough experimental results should be available by fall of this year so that we can review the stage design again at that time.

H.W. J-2 program doesn't seem to get off the pad! What's wrong? B

4. H-1 ENGINE: Seven tests were conducted with the Low Delta-P fuel injector. Standard bomb and pulse system induced momentary instability. The engine returned, however, to stable operation in all tests.

5. F-1 ENGINE: There was an instability occurrence on engine 010 at about 150 seconds of mainstage firing--no hardware damage. A total of 358 seconds of mainstage firing at full thrust was conducted on engines 009, 010, and 011 from 3-28-63 to 4-4-63.

Thirteen injector tests were conducted to separate and evaluate the effects on stability of low injection velocities and propellant feed system isolation devices.

Funds for fabrication and installation of a newly designed test stand 1-B flame deflector are urgently needed. Gimbal testing has to be suspended until replacement can be effected.

H.W. How can I help you? B

Support service building site at Edwards Air Force Base has been approved by the Air Force.

6. F-1 INJECTOR STABILITY (GENERAL): While no real solution has yet been found to our problem, several approaches have indicated some degree of potential relief. These are (a) Feed system decoupling devices, (b) Reduced propellant injection velocities (equivalent to increased injection hole diameter), (c) Baffling (combustion side), (d) "Wagon wheel" concept (produces a face-heating problem, however). Full effort is continuing in the pursuit of all other injector concepts. It is my feeling that definite progress is being made.

NBG

7. S-IVB BATTLESHIP TESTING STATUS: On 4-2-63 a hydrogen leak at a connection boss started a fire and damaged electrical wiring of the hydraulic pumps on engine #3. It was cut off at 31 seconds. This stresses the importance of armored cables.

← Action taken? B

GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

Memorandum

Mr. Marshall, 876-0715

TO Mr. Flake, M-SAT-S-II

DATE March 27, 1963

FROM Chairman, Vehicle Mechanical Design Integration Working Group, M-SAT-WM

M-P&VE-VH-137

SUBJECT Action and Decision Items Resulting from the Propulsion Splinter Meeting of the S-II Vehicle Mechanical Design Integration Working Group

A meeting convened March 26, 1963 in Bldg. 4610, Conference Rm. 1054, to discuss current vehicle propulsion system design problems. The enclosed Action and Decision Items resulted from the meeting. It is requested the stage contractor be directed to comply with the enclosures.

H. R. Palaoro

H. R. Palaoro

2 Encs:
a/s

Copies to: Dr. Mrazek, M-P&VE-DIR
Mr. Weidner, M-P&VE-DIR
Mr. Hellebrand, M-P&VE-DIR
Mr. Schulze, M-P&VE-E
Mr. Goerner, M-P&VE-F
Dr. Lucas, M-P&VE-M
Mr. Paul, M-P&VE-P
Mr. Kroll, M-P&VE-S
Mr. Shannon, M-P&VE-M
Mr. Askew, M-P&VE-PP
Mr. Mulloy, M-P&VE-S
Mr. Kolyer, NAA-S&ID/Huntsville (5)
Mr. Drummond, M-P&VE-OJ
Mr. Haire, M-P&VE-VB

MSFC - Form 488 (August 1960)

Attachment #1

March 26, 1963, Propulsion Splinter Meeting Action Items

1. Action Item No. 1 - Review Meeting

MSFC (M-P&VE-VH) will arrange a meeting by October 1, 1963, to review data relative to the decisions reached at this meeting. This is the latest date decisions relative to vehicle SA-504 can be incorporated before production.

2. Action Item No. 2 - Common Bulkhead Δ P

Mr. Charles Wood (M-P&VE-PT) will prepare and forward to Propulsion and Vehicle Engineering Division Director, curves describing the delta pressure across the common bulkhead.

3. Action Item No. 3 - Insulation Mechanical Properties

Space and Information Systems Division (S&ID) will prepare a test program to verify the mechanical properties of the one inch thick insulation material, and report status in the Fifth Vehicle Mechanical Design Integration Working Group Meeting.

4. Action Item No. 4 - Ducts Configuration

S&ID will forward to MSFC and Rocketdyne, the S-II feedlines duct configuration (as soon as possible).

5. Action Item No. 5 - Thrust Structure Analysis

S&ID will forward the thrust structure stress analysis associated with the redesign to meet a 240,000 pound J-2 Engine thrust (due April 10, 1963).

6. Action Item No. 6 - Recirculation Pumps

MSFC (M-P&VE-P) will review the S&ID and Douglas Aircraft Company, Inc. recirculating pump specifications to provide a common specification and determine possible gains by making it Government furnished equipment (GFE) (due April 15, 1963). Mr. Palaoro

We put these into SII and SIVB also??

7. Action Item No. 7 - Pump Power Requirements I thought MMM only! B

MSFC (M-P&VE-VH) will forward electrical power requirements for the recirculation pumps to Astrionics Division for inclusion in the total vehicle power requirements (due April 5, 1963).

8. Action Item No. 8 - Conductivity Value (K)

S&ID will initiate action to expedite definition of the insulation thermal conductivity (K) value and inform MSFC of the method for expediting the action.

9. Action Item No. 9 - Regulator Specification

S&ID will provide regulator specifications to MSFC for review, such that MSFC may establish the item for sole source procurement (due April 8, 1963).

Enclosure 1

10. Action Item No. 10 - Phase II Control Drawings

MSFC (M-P&VE-VH) will review the Phase II Control Drawing status and attempt to define the procedure and specific drawings required for Phase II review (due Fifth VMDIWG Meeting).

11. Action No. 11 - Interstage Ducts

S&ID will prepare a layout describing the duct arrangement for conditioning the S-II aft interstage (due April 17, 1963).

12. Action Item No. 12 - Thrust Structure Closeout

S&ID will investigate the feasibility of providing a closeout of the thrust structure cone (due April 17, 1963).

13. Action Item No. 13 - Electronic Equipment

S&ID will review and provide layouts necessary to condition the electronic equipment utilizing a 1.5 and 6 psi gas system (due April 16, 1963).

March 23, 1963, Propulsion Splinter Meeting Decision Items

Decision Items No. 2 thru 14 apply to S-II Stage Vehicle No's. S-II-1-FD, S-II-2 and S-II-3.

1. Decision Item No. 1 - 240,000 Pounds Thrust

The S-II Stage design must be capable of utilizing J-2 Engines with a maximum thrust of 240,000 pounds.

2. Decision Item No. 2 - Insulation Thermal Conductivity

The insulation K value for the LH_2 tank will be .34 BTU in./hr.-ft.^{2}-^oF.

3. Decision Item No. 3 - Insulation Thickness

The insulation thickness on the LH_2 tank will be .8 - 1.0 in.

4. Decision Item No. 4 - Total Heat Leak

The total heat leak into the LH_2 tank will be Q = 128,000 BTU.

5. Decision Item No. 5 - LH_2 Tank Pressure

The limit load pressure in the LH_2 tank will be 39 psia.

6. Decision Item No. 6 - LH_2 Vapor Pressure

The vapor pressure in the LH_2 tank will be 16.2 psi.

7. Decision Item No. 7 - Suction Line Diameters

The LH_2 and LO_2 suction line diameters will be 8 inches.

8. Decision Item No. 8 - Step Pressurization

Step pressurization will be used in LH_2 and LO_2 tanks.

9. Decision Item No. 9 - LH_2 NPSH

The LH_2 NPSH is 234.7 ft. of LH_2.

10. Decision Item No. 10 - LO_2 NPSH

The LO_2 NPSH is 43.85 ft. of LO_2.

11. Decision Item No. 11 - Vent Valve Band

The vent valve band in the LH_2 and LO_2 tanks is 2 psi.

Enclosure 2

12. Decision Item No. 12 - LO_2 Tank Pressure

The limit load pressure in the LO_2 tank will be 42 psia.

13. Decision Item No. 13 - LO_2 Vapor Pressure

The vapor pressure in the LO_2 tank will be 18.5 psi.

14. Decision Item No. 14 - LO_2 Thermal Stratification

A thermal stratification of $3^{o}F$ will be used in the LO_2 tank.

GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

Memorandum

Mr. Griner, 876-7417
Mr. Aberg, 876-0715

TO Mr. Flake, M-SAT-S-II
Mr. McCulloch, M-SAT-S-IVB

DATE March 29, 1963

FROM Chairman, Vehicle Mechanical Design
Integration Working Group, M-SAT-WM

M-P&VE-VH-142

SUBJECT Action Items from S-II/S-IVB Interface
Meeting of Vehicle Mechanical Design
Integration Working Group

1. A meeting convened March 27, 1963, in Room 1054, Building 4610, to discuss the J-2 Engine chilldown, propellant recirculation, and S-II/S-IVB interstage pressurization. Rocketdyne, Space and Information Systems Division, Douglas Aircraft Company, Inc., and Marshall Space Flight Center personnel were in attendance.

2. It is requested the stage contractors be directed to comply with the enclosed action items resulting from the subject meeting.

H. R. Palaoro

H. R. Palaoro

1 Enc:
Action Items

Copies to: Dr. Mrazek, M-P&VE-DIR
Mr. Palaoro, M-P&VE-V
Mr. Paul, M-P&VE-P
Mr. Kroll, M-P&VE-S
Mr. Schulze, M-P&VE-E
Dr. Lucas, M-P&VE-E
Mr. Askew, M-P&VE-PP
Mr. Shannon, M-P&VE-M
Mr. Mulloy, M-P&VE-S
Mr. Griner, M-P&VE-VJ
Mr. Kolyer, NAA-S&ID/Huntsville (5)
Mr. Shaver, NAA-DAC/Huntsville (5)
Mr. McQueen, M-AERO-PS
Mr. Thionnet, M-AERO-PS

MSFC - Form 488 (August 1960)

Attachment #2

March 27, 1963, S-II/S-IVB Splinter Meeting

1. Action Item No. 1 - Recirculation Pumps

MSFC (M-P&VE-P) will review the contractor specifications and standardize the performance and installation requirements of the recirculation pump. Upon completion of the review, S&ID and DAC will be directed to procure a common item (due April 15, 1963). (This is a repetition of Action Item No. 6 of memorandum M-P&VE-VH-137, dated March 27, 1963.)

2. Action Item No. 2 - Forward Recirculation

S&ID and DAC will proceed with design of the forward flow recirculation scheme. The forward vs. reverse recirculation question will only be reviewed after Rocketdyne test data has become available (no deadline).

3. Action Item No. 3 - T/C Chilldown

The stage contractors (S&ID and DAC) will proceed on design of a He purge and chilldown system for the J-2 Engine Thrust Chamber (immediate action).

4. Action Item No. 4 - T/C Chilldown Testing

Rocketdyne will obtain test data on a combined LN_2 chilldown and a follow-through He purge of the J-2 Engine Thrust Chamber (due next Stage/Engine Interface Meeting).

5. Action Item No. 5 - He Purge Requirements

MSFC (M-P&VE-E and M-P&VE-P) will select a common He temperature requirement. The total SATURN V requirements for cold gases will be coordinated (due April 30, 1963).

6. Action Item No. 6 - S-II Forward Skirt Pressure

S&ID will design the Forward Skirt to a 5 psi differential (burst) pressure with an effective leakage area no greater than 30 in^2 (immediate action).

7. Action Item No. 7 - S-IVB Aft Interstage

DAC will proceed with design of the aft interstage using 4.3 psi differential (collapsible) pressure with a total vent area of approximately 160 in^2 with an effective leakage area no greater than 15 in^2 (immediate action).

8. Action Item No. 8 - Splinter Meeting

MSFC (M-AERO-AA) and DAC will meet to coordinate the final vent area and location (as soon as possible).

9. Action Item No. 9 - Interstage Pressure

S&ID and DAC will use 2 in. H_2O purge pressure in the design of the S-II and S-IVB interstage conditioning systems (immediate action).

April 15, 1763

Form TA-11 (August 1962) (Replaces MSFC 2033)

DATAFAX TRANSMISSION

Msg No. 1480

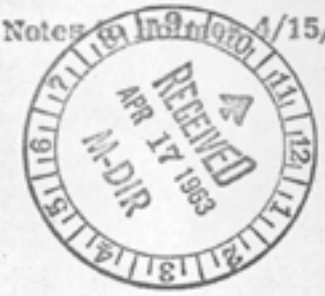
TO : J. C. McCall, M-DIR, Marshall

DATE April 17, 1963

FROM : R. Heiser, LO-DIR, Cape

TIME

SUBJECT: Notes [illegible] 4/15/63 Debus



Copies to:
M. Kess
M. Maus
M. Harman
4-17-63

4/15/63 NOTES DEBUS

1. The Joint NASA/DOD Study Group on "PRO-RATA Share" of funding for operations of the AMR met at PAFB this week. Otis Redfield, of the Office of Programs, and Lt. Col. Clark, of LOC, were the NASA representatives. (Bernie Johnson of your office could not attend.) Indications are that the Group will recommend continuation of present practice, i.e. DOD budgeting and funding for operation and maintenance of AMR. DOD representatives feel very strongly that this practice should continue. Mr. Redfield is checking in Headquarters whether or not NASA feels strongly on this matter.

2. Additional Personnel for LOC. We have been informed by Headquarters that an additional 94 Civil Service and 20 summer students have been authorized for LOC. This will bring LOC's authorization to a total of 965.

3. Pneumatic and Electrical Distribution System, LC-34. On April 5, 1963, a contract was signed by American Machine and Foundry Company, Inglewood, California, for the purchase, modification, fabrication, assembly, installation, and testing of the Pneumatic and Electrical Distribution System for LC-34. Contract cost is approximately $218,000. All work under the contract is scheduled for completion by August 1, 1963.

4. Saturn V Deck Motion Simulator. Equipment purchase was initiated for material to be used in constructing a Saturn V deck motion simulator at Test Division, MSFC. A platform about five feet square will produce an oscillating base equivalent to the wind sway motion of the vehicle. The platform will be used to conduct evaluation of concepts for umbilical inspection, repair, and exchange in addition to developing techniques for coupling extension platforms, entering the vehicle hatches, and performing useful work under these conditions. Target date for operational readiness is June 15, 1963.

5. Space Exhibit Center. Two visitors from the Department of Interior, National Park Service (Butterfield and Cox) discussed possible interests in the construction, operation, and maintenance of a space museum on MILA. The National Park Service is manned and trained to perform this type of an operation. The representatives were interested in the NASA program, and I plan to look into this as a possible way of operation.

6. A Memorandum of Understanding between LOC NASA Test Support Office and Manned Spacecraft Center was formalized 3 April 1963 which establishes operating concepts of MSC projects within the framework of NTSO. In effect, this document simply spells out the ground rules under which the MSC projects will operate as part of the NTSO.

7. Wet Test Status 37B. The barge "PROMISE" arrived Monday, April 15, with the Dynamic Test Booster for wet testing 37B. The S-I stage will be erected Thursday, April 18. S-IV stage will be erected Friday, April 19. This is the beginning of facility checkout.

8. SA-5. SA-5 AMR schedule is still fluid pending determination of shipping dates from MSFC for the S-I-5 and SACTO for the S-IV-5. We have told MSFC that a 3rd quarter launch date is possible if arrival of both units is no later than the 1st week of July.

9. General Electric Support Task Orders have been issued to G.E. to provide 49 "in-house" engineering personnel and 70 "out-of-house" design personnel for assistance in the LOC Launch Support Equipment Engineering Division in Huntsville.

10. Joint Session of the Florida Legislature. Today, General Davis and I address a joint session of the Florida Legislature to support and encourage the establishment of a university in the East Central Florida Coast region.

NOTES 4/15/63 CONSTAN B 4/15

1. BOEING IAM

The Boeing International Association of Machinists has been trying to reach a settlement for a new collective bargaining agreement. Thus far all efforts have failed. At present a Taft-Hartley injunction is in effect but terminates as of 12:01 a.m. April 16, 1963. It is expected that the 205 Boeing people covered in this bargaining unit will strike. Pickets are expected at the Michoud plant. Just settled! B

2. S-I QUARTERLY REVIEW

Chrysler Space Division has been notified that the 4th quarterly review will be held at Michoud on May 14 and 15, 1963. Preparations are underway for presenting the 4th quarter activities and tentative direction for FY 64.

NOTES 4-15-63 FORTUNE

B 4/15

1. MATTERS DISCUSSED AT NASA HEADQUARTERS 11-12 APRIL:

a. Cryogenic Supply Plant for MTO: Sat in on meeting, arranged by Central Planning Office, to better understand MTO responsibilities. MTF Working Group providing technical input but COR assignment not yet clear. Headquarters under pressure from oil industry to extend plant location beyond 50 mile radius from MTO. We developed a Marshall position during meetg, 12 April and will defend it B W.F.

b. ML Support for MTO: Freitag emphasized desire to keep in close touch with MTO, in fact all MSFC operations. He hopes to spend a couple days, on each trip to Huntsville, meeting key personnel, discussing problems. He specifically mentioned Brainerd Holmes misunderstanding Interstate Highway 10 bridge vs tunnel decision, which came out in our meeting at Cape Canaveral. Feel sure this was MP oversight, not ML. Crone said presenttation under way to clarify MP-ML coordination efforts. Bill Ashley in ML outer office made available by Freitag for MTO needs. ✓ (CP was details)

c. Component Service Facility: Crone apologized for staff inadequacies (Jim Smith's illness) in not pressing forward our request for this facility in FY 64 Budget. He promised to get it to Holmes in short order. Also got assurance for more advance design funds for FY 64, ! for reprogramming action previously requested by MTF Working Group, and for Criteria development money before we submit FY 65-COF requirements. ✓

d. Ground Breaking and Dedication Ceremonies: Mr. Webb's secretary said he was committed for week of 15 May, could we change it to 21 or 23 May? Bonnie Holmes says 21st. Will have Bart Slattery prepare invitations for this date, for your signature. I gathered impression we could call on V.P. Lyndon B. Johnson, or Sen. Anderson, if Sen. Stennis couldn't be there. Will see latter at 1000, 18 April, 1963. ✓

→ Should be very important for him! B

(margin: By; Rennie, PC)

e. Dr. Seaman's Office: Great interest was shown in our sole source procurement of Instrumentation and Date acquisition Systems, in our Technical and general support services operations, and in Mississippi community development and other problems. I explained why we had asked selection of AETRON for the first item, debated GE's getting house-keeping in the second, and were trying to build up local capabilities in the third. Bay St. Louis sanitation needs were among latter requirements. Dr. Seaman's said he had signed off AETRON selection, would expedite news release on GE support, and had okayed letter on Bay St. Louis. Paul Ramey worked late Friday afternoon on the GE announcement, and the draft I saw looked good. Dr. Seaman's was also concerned about Interstate 10 crossing the Buffer area so close to the Test Stands. I mentioned MTF Planning Board review of this. ✓

WF

Phase I of it, yes!
II and III not "so"
but wide open! B

NOTES 4/15/63 GEISSLER B 4/15

1. Mission Control Operations Panel: A meeting was held on April 3 and 4 in Houston to constitute the "Mission Control Operations Panel." It was agreed that this panel would resolve all interface problems in the area of Apollo mission control operations, specifically with regard to the S-IVB orbital check-out. MSC prefers to make all operational decisions in Houston but does not object to operational support from Huntsville. MSC requested considerable manpower support in the order of 20 persons for preparations, simulations, and actual operations. However, they offered to supply these people from their side if we would prefer that. No decisions were made in this meeting but MSFC will have to formulate an official position with respect to the desired degree of participation very soon. The meeting was chaired by J. Hodge, MSC. MSFC was represented by Dr. Haeussermann, Dr. Speer and others. Mr. E. Bertram was the leader of the LOC group present.

2. Fluid Mechanics Laboratory: Aeroballistics Division made a presentation to a group from NASA Headquarters on April 8. The purpose of the presentation, (requested by the Headquarters people from Capt. Freitag's office) was to familiarize the Headquarters people with the need for our proposed Fluid Mechanics Laboratory. Reactions appear favorable at this time. We have been asked to make a similar presentation to a larger Headquarter group in Washington at an early date, perhaps by May 1. The cooperation and interest of our Central Planning Office and Facilities Engineering Office has been very good. Without their interest, we might not have had the opportunity to present our problems and needs to Headquarters.

3. MMM Studies: Mr. deFries of Aero's Systems Studies Office and Dr. Lee of OMSF discussed MMM studies, which will be continued over the next 6 - 9 months. The following tentative agreements were reached: (a) Marshall will work on the MMM preliminary design and report on it in September; (b) Currently, the S-VI and Lunar Direct Flight Pair (logistics vehicle and personnel carrier) have priority; (c) Marshall will define the S-VI and report findings in late September; (d) Investigation of Lunar Direct Flight Pair (non-nuclear) will be by contract, under supervision of Aero's Office of Systems Studies. OMSF will furnish approximately $1 million for the 1 year study; (e) Dr. Lee of OMSF is transferring $2 - 4 hundred thousand to us immediately for the first phase of the Lunar Direct Flight Pair investigation; (f) It was tentatively agreed to attempt to get a sole source contract with STL for this study, justification being that STL was educated at NASA's expense in 3 previous studies on same subject, 2 of which were pertinent to manned direct flight to the moon; (g) Other MMM applications will be briefly examined by Marshall, for the time being, only for the purpose of putting the necessary design constraints on the MMM.

E.F. Looks good to me
B

GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

RECEIVED
APR 15 1963
M-DIR

1) E. Rissler
2) H. Mrazek
} under closed envelope

My reaction!

Memorandum

TO See distribution

DATE April 11, 1963

My God, what have I started with one innocent question!!

FROM Director, Aeroballistics Division
M-AERO-DIR

PLEASE, let's do something to reduce

SUBJECT Comment on P&VE Memorandum, March 26, 1963, subject: "Answer to Notes 3-11-63 and 3-18-63" acoustic noise, rather than argument it!

B 4/15

1. The recent notes to Dr. von Braun (3-11-63, 3-18-63) discussed the results of acoustic measurements from dynamic wind tunnel programs for the Saturn-Apollo configuration. These notes were factual reports, not intended to trigger any discussions as to "who did what," etc., but to make Dr. von Braun aware of the fact that the aerodynamic noise produced by the "dirty" Apollo configuration is severe indeed.

2. The memorandum by Dr. Mrazek, subject: "Answer to Notes . . . ," dated March 26, 1963, unfortunately dwells at some length on identification of division contributions and contains several inaccurate and misleading statements. Thus, it is necessary to comment on the memorandum in some detail in order to set the record straight. The undersigned emphasizes that he considers discussions of this type as undesirable and not helpful to the creation of an atmosphere which is conducive to a team effort; however, the implications of lack of sufficient foresight by our division, as well as insufficient response to external stimulation, leave us little choice but to point out some pertinent facts. We are concerned to protect our reputation, not to imply lack of proper action by other divisions.

Couldn't agree more! B

3. The statements of paragraph 1, subject memorandum should be examined in the context of the following chronology of the Aeroballistics Division effort in the area of unsteady aerodynamics and acoustics for Saturn-Apollo.

a. During the spring and summer of 1961, Mr. E. Linsley, M-AERO-A, participated in evaluation of Apollo proposals and became concerned with the "dirty" configuration. Mr. T. Reed, M-AERO-TS, was assigned by the Director, Aeroballistics Division to the continuing appraisal of Saturn-Apollo unsteady aerodynamics and buffeting to supplement the existing efforts in M-AERO-A and M-AERO-E.

b. During the fall of 1961, preliminary wind tunnel programs were conducted by MSC and MSFC. Oscillatory pressure measurements were made for the configuration, and very rough flow was indicated. An aerodynamic shroud was suggested for Apollo by M-AERO to MSC; however, MSC was not interested.

c. During September and November, 1961, two meetings were held with MSC personnel at MSFC to discuss aeroelastic control and buffeting problems for Saturn-Apollo. Preliminary oscillatory pressure data were presented by Mr. G. Rainey of LRC at this time. Personnel of LRC exhibited some concern for the buffeting pressure levels and proposed to continue their dynamic wind tunnel programs. Beginning 11-13-61 the Aeroballistics Division Weekly Notes to Dr. von Braun discussed the buffeting problem at some length and the progress made in obtaining a solution. In particular the proposal for an aerodynamic shroud for Apollo was a popular topic and was mentioned very frequently until the spring of 1962. It was also discussed in board meetings and in the Space Council Meeting.

d. In January, 1962, the Aeroballistics Division effort in this connection was intensified. Mr. Linsley and Mr. Reed visited LRC to review dynamic test results and LRC proposed a more extensive aeroelastic program. These discussions eventually led to the 8% elastic model program, a joint MSC-MSFC effort, and the tests were conducted in the fall of 1962. Mr. Reed also visited ARC and Lockheed, Sunnyvale, to discuss the unsteady aerodynamic problems of Saturn-Apollo. This visit prompted immediate preliminary aeroelastic tests and eventually led to the Lockheed aeroelastic studies, the ARC simplified aeroelastic studies, and the ARC oscillatory pressure test program. Data requested by P&VE, subject memorandum, enclosure 1, was eventually obtained in the last of the above programs. Note that these discussions with ARC took place four weeks before, not ten weeks after the P&VE request. Note also that the P&VE request essentially desired further information from tests already conducted at LRC results from which were presented in M-AERO-A-4-62. The program referred to as initiated ten weeks later was, in fact, the Douglas acoustic program which had no connection with the above request in subject memorandum, enclosure 1.

e. April 1, 1962 - Douglas first proposed acoustic wind tunnel measurements in area of blow-out panels to M-AERO-E. Personnel of M-P&VE-S were invited to participate at an early stage

and after several discussions with Douglas personnel, the program was finalized. Authorization was requested from M-SAT on May 10, 1962, (subject memorandum, enclosure 2), six weeks after the original telephoned proposal on April 1. It should be noted that M-P&VE personnel actually participated in the execution of only this one program. M-AERO was motivated in the other four dynamic programs by concern for a possible control or flutter problem; however, M-P&VE was kept informed in every case. All dynamic programs which were conducted for Saturn-Apollo were oriented to obtain structural design data as well as control data.

f. Spring 1962 - Most of this period was spent in activating the various Saturn-Apollo dynamic programs in cooperation with MSC. One positive result achieved here was the combination of the Ames oscillatory pressure program with an MSC-NAA acoustic program. One model was eventually utilized for both programs. Five different dynamic programs had thus been initiated by this time and results were expected by September 1962.

g. June 1962 - Douglas proposed to MSFC that SA-4 be modified to simulate SA-5 so as to obtain flight data on oscillatory pressures and acoustic environment. This proposal was eventually authorized due in part to continuing efforts by Aeroballistics Division.

h. Summer 1962 - All the dynamic programs were well underway. The deadline for results, which was originally September 1, was relaxed as it became apparent that the SA-5 schedule would slip and that Apollo would not be flown until SA-6. Preliminary results became available toward the end of the summer and were circulated to interested parties.

i. March 1963 - A considerable amount of data was not available on all programs. This data was presented and discussed in a meeting at Houston, March 6, 1963.

4. The statements of paragraph 2 and 3 of the subject memorandum refer only to the Douglas acoustic program in which M-P&VE Division personnel had been invited to participate. This program was regarded as a joint effort between Aeroballistics and P&VE Divisions, and thus it seemed reasonable for P&VE to perform data reduction with existing computer programs rather than to set up a redundant effort in Aeroballistics Division. It should be noted that three branches of Aeroballistics

Division have been engaged for perhaps two years in the reduction, analysis, and utilization of random atmospheric data, and thus the capability for the statistical analysis of such data does exist. Douglas was requested contractually to perform preliminary octave band analysis and determine sound pressure levels. This preliminary data reduction was to serve as a basis for later reduction to PSD by MSFC.

5. Paragraphs 4 and 5 of the subject memorandum are very nearly factual statements.

6. The facts concerning the Houston meeting mentioned in paragraph 6 of the subject memorandum are as follows: MSC set up the meeting on their own initiative and invited MSFC representatives through M-AERO-E. M-AERO-E on their own initiative determined the interested organizational elements, i. e., M-P&VE-S, and originally planned to secure the services of a NASA Headquarters airplane to transport about forty people to the meeting. MSC vetoed this plan on the grounds that only a small conference room was available and requested that MSFC limit attendance as much as possible. This was explained to all elements of MSFC which were concerned and the list of attendees was cut to about fifteen. At that time it was thought that the reduction in the number of attendees had been handled in a humane and reasonable manner through negotiation with the organizational elements concerned.

7. Paragraph 7 of subject memorandum is correct in indicating that the aerodynamic noise level was high at various points over the vehicle and that a high noise level was expected; however, the results are hardly routine and the entire dynamic program is probably the most comprehensive ever conducted for any configuration. The aerodynamic noise level measured at the surface was about 10 db higher than that observed for Mercury-Redstone.

8. With reference to paragraph 9, subject memorandum, it seems rather farfetched to dispute as to the origination of any project or program, and the particular case of flight measurements has been considered by Aeroballistics Division as a joint effort of the participating divisions. However, the following dynamic measurements have been requested by Aeroballistics Division.

SUBJECT: Comment on P&VE Memorandum March 26, 1963, subject: "Answer to Notes 3-11-63 and 3-18-63"

April 11, 1963

	Sound Intensity	Fluctuating Pressure
Saturn I		
SA-3 Centaur Simulation (The frequency response of the transducers was inadequate; however static pressures were obtained)		6
SA-4 S-IV Protuberances	2	3
SA-5 S-IV Protuberances (These measurements requested but channels are unavailable)	8	
SA-7 through SA-10	2	7
Saturn V		
SA-501 and SA-502 (Additional measurements are under consideration)		5

E. D. Geissler

Enclosure:
M-P&VE Memo, dated March 26, 1963

Distribution:

Dr. von Braun, M-DIR
Dr. McCall, M-DIR (20 cys)
Dr. Rees, M-DEP-R&D
Dr. Mrazek, M-P&VE-DIR
Mr. Burrows, M-P&VE-REL
Mr. Belew, M-P&VE-O
Col. Fellows, M-P&VE-N
Mr. Palaoro, M-P&VE-V
Mr. Dahm, M-AERO-A
Mr. Goerner, M-P&VE-F
Mr. Schulze, M-P&VE-E
Mr. Kroll, M-P&VE-S
Mr. Paul, M-P&VE-P
Dr. Lucas, M-P&VE-M
Dr. Geissler, M-AERO-DIR
Mr. Reed, M-AERO-TS
Mr. Holderer, M-AERO-E
Mr. Horn, M-AERO-D

GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

Memorandum

TO Dr. von Braun, M-DIR DATE MAR 26 1963

FROM Director, Propulsion & Vehicle
Engineering Division, M-P&VE-DIR

SUBJECT Answer to NOTES 3-11-63 and 3-18-63 GEISSLER

REFERENCE NOTES 3-25-63 MRAZEK

1. The Structures Branch, Propulsion and Vehicle Engineering Division, has for some time been well aware of the possibility of buffeting loads and aerodynamic noise existing over the vehicle structure during the boost phase. In fact, enclosure 1 shows that this branch recognized the problem and brought it to the attention of the Aeroballistics Division. Enclosure 2 shows that approximately ten weeks later Dr. Geissler took action to initiate a wind-tunnel test.

2. During, and after this time interval, members of the Structures Branch met several times with personnel from the Experimental Dynamics Branch of the Aeroballistics Division to discuss the test program, recommend instrumentation and discuss reduction of test data.

3. It was decided that due to a lack of funds for contractual coverage, and lack of capability of the Aeroballistics Division to adequately analyze and/or reduce the test data; the Structures Branch would analyze the data after raw data was reduced by the Computation Division to the power spectral density plots as required. This is shown by enclosure 3.

4. Due to machine analyzing problem areas in the Computation Division, they are just now starting to analyze the test data which was made available to them the last week of December 1962. It will take the Structures Branch several months to perform overall detailed analysis of these data. This data is required to determine whether or not there are any structural problems in the area of:

a. Possible shielding for human occupancy.

b. Sensors being excited.

c. Fatigue failures.

d. Panel Flutter.

(AX) CS

SUBJECT: Answer to NOTES 3-11-63
3-18-63 GEISSLER

MAR 26 1963

5. The reason for our original request to the Aeroballistics Division was to obtain test data in the areas of vehicle protrusions, change of vehicle geometry, etc. Upon completion of evaluation of the final wind tunnel data, our acoustic and vibration specifications, loads, etc., will be modified to account for effects of aerodynamic noise.

6. The March 6, 1963 meeting, referred to by Dr. Geissler, was attended by two Structures Branch personnel after some difficulty. We were originally invited to attend with four spaces alloted to us, however, when the Aeroballistics Division was informed we were not in a position to present our power spectral density data, we were cut to three spaces and finally after discussions between the Structures Branch office and Mr. Holderer, we were given two spaces. The purpose of this meeting was to exchange first preliminary data among the various people running tests in this area. These were George C. Marshall Space Flight Center, Douglas Aircraft Company, North American Aviation, Inc., Langley Research Center, Lockheed Missiles and Space Company, and Ames Research Center. Douglas Aircraft Company personnel applied their data to the S-IV stage, in particular the blow-out panels, and found the present design to be adequate. This information was presented in handout form at the meeting and all attendees received copies. Studies by the Structures Branch, as mentioned above, will check these results.

7. The preliminary data as presented by Douglas Aircraft Company does seem to verify that high aerodynamic noise will occur at various stations on the vehicle. These data are considered routine verifying results of previous programs such as aerodynamic noise excitation measured in the MERCURY-REDSTONE instrument compartment and capsule adapter.

8. This is a complex structural problem area; however, we feel that we have developed adequate techniques, and are further refining these techniques, to serve as engineering tools to handle the problems listed in paragraph 4a through 4d.

9. In addition, it should be noted that the Structures Branch was the initiator of the request for installation of microphones to be flown on the Block I and Block II vehicles to further study these problems and verify wind tunnel tests.

W. A. Mrazek

RECEIVED
APR 15 1963
M-DIR

4 Enc:
1. Memo No. M-P&VE-SD-75-62
2. M-AERO-DIR Memo dtd May 10, 1962
3. Memo No. M-P&VE-SD-397-62
4. NOTES 3-18-63 GEISSLER

Copies to: See page 3

Clean copies of our notes of Mrazek's 25 March notes attached.

SUBJECT: Answer to NOTES 3-11-63 and 3-18-63 GEISSLER

MAR 26 1963

Copies to:
Dr. McCall, M-DIR (20 cys)
Dr. Reas, M-DEP-R&D
Mr. Burrows, M-P&VE-REL
Mr. Balaw, M-P&VE-O
Col. Fallows, M-P&VE-N
Mr. Palaoro, M-P&VE-V
Mr. Goerner, M-P&VE-F
Mr. Schulze, M-P&VE-E
Mr. Kroll, M-P&VE-S
Mr. Paul, M-P&VE-P
Dr. Lucas, M-P&VE-M

OFFICE OF DIRECTOR

MSFC ROUTING SLIP					
	CODE	NAME	INIT.	☐ ACTION	☐ INFORMATION
1	M-MS-CH	Vic Sorensen			
2					
3					
4					

ck w 6-21! Mr. Katz is working on

REMARKS

Vic:

Notes 4-15-63 files NOTES

Note attached. We want to find out more about the Indiana University system and how it works. We can submit this to the Graduate Study Steering Group for introduction to the University of Alabama.

Harry

6/21/63
Mr. Dowdy has info & will discuss this w/ the Steering Committee at the next Board meeting of Committee
Bh

CODE	NAME
M-DEP-ADM	Gorman

MSFC - Form 495 (Rev. February 1961)

NOTES 4-15-63 GORMAN

B 4/15

1. AETRON CONTRACT: The procurement plan for the technical systems at MTF was approved by Dr. Seamans on April 9, 1963. ✓

2. MICHOUD OPERATIONS: Additional funds of $1,416,000 for Chrysler Plant modifications were received by TWX on April 8, 1963. Funds were transmitted by Datafax to Michoud Operations the same day. P&C advised that a letter authorizing Chrysler to proceed with commitments against these funds was issued on Thursday, April 11. A supplement to Chrysler's contract was signed by Mr. Davis and Chrysler on Saturday, April 13, 1963. ✓

3. RIFT PROGRAM: No-cost Contract NAS3-5612 has been executed with General Dynamics/Astronautics in order to provide for the exchange of advance technological information on the RIFT Program. Previous report indicated that a similar contractual device had been executed with Douglas Aircraft Company. These unsuccessful contenders for the RIFT prime contract are thus able to keep abreast of the space/nuclear field via access to Government information in exchange for their updated review, analysis, and reports. ✓✓

4. CONTRACT CHANGES TO S-IV: During the course of the meeting with Douglas last Thursday, there may have been some confusion as to how we are instituting changes in the Douglas contract. I checked this out and find there is no delay whatsoever in the work because of the need to introduce changes into the contract. For example, we initiated negotiations on April 9 with the Douglas Company for definitization of approximately 24 changes. The work, of course, is already under way. ✓

5. ENGINEERING BUILDING AT MICHOUD: An Advance Notice for Phase I of the new engineering building at Michoud has been mailed to approximately 150 contractors. Phase I covers the piling and foundation work. Approximate value of the proposed work is $700,000. In order to save time, it is planned to do this building in phases. Phase I, described above; Phase II, structural steel; Phase III, the remainder of construction. This plan permits parallel design with phases I and II. It saves us several months on the schedule. ✓

6. PREGNANT GUPPY: Preliminary negotiations with Aero Spacelines, Inc., on utilization of the Pregnant Guppy were terminated without agreement. Their proposal as presented was unacceptable to this Center in both the cost and technical aspects. ASL representatives were instructed to revise, substantiate, and resubmit proposal. ✓ (H.F. You know, of course, that we are quietly counting on the Guppy for S-IV-S) B

7. UNIVERSITY OF ALABAMA: This week, University of Alabama contracting officer, Dr. Alex Pow, and other officials are meeting with Army Missile Command and Marshall representatives to negotiate a contract for an expanded Graduate Program in Huntsville. ✓ Next year's program should include local programs in Math, Physics, and Engineering that meet the requirements for the Masters Degree without going to Tuscaloosa. ✓

Harry F. Indiana University runs closed-loop TV lectures, given in main campus, out to several University Centers and gives full credit for attendance of same. Suggest U of Ala ✓ follow this pattern. Please explore! B

B 4/15

NOTES 4-15-63 GRAU

* 1. DOD INSPECTION POLICIES: Mr. Howard Weiss, Office of Reliability and Quality Assurance, NASA Headquarters, advised the Quality Assurance Division that he had received a copy of a memorandum from the Office of the Secretary of Defense to the Departments of the Army, Air Force and Navy authorizing these services to use NASA inspection status stamps when requested and issued by NASA installations. The memo explains the differences of purpose between Department of Defense and NASA stamps and provides that certain information (part number of items upon which stamps are to be used, characteristics of items to be inspected by Government Inspection Agency personnel, etc.) must be provided Government Inspection Agency personnel by the NASA installation when inspection is to be delegated. Mr. Weiss considers that this memorandum represents a significant step in improving the quality of service received from Department of Defense Agencies.

2. FAIRCHILD STRATOS QUALITY PROGRAM PLAN: Review of the preliminary Quality Program Plan submitted by the Fairchild Stratos Corporation, Bladensburg, Maryland, (Micrometeoroid Measurement Capsules Contract), has been completed and very few changes will be required. This is primarily due to the fact that a representative of the Quality Assurance Division spent three weeks there during the development of this plan.

3. SOLDERING SCHOOL AT LOC: A new school in soldering opened at Cape Canaveral, Florida on April 1, 1963 under the technical support of the Quality Assurance Division and managed by the Launch Operations Center.

4. SATURN INSTRUMENT UNIT MOTION SIMULATOR: The SIUMS control system has been checked out and its position is now being optically calibrated with its digital readout system in preparation for the checkout of the Instrument Unit for SA-5.

* 5. QUALITY ASSURANCE INTERFACE MEETINGS: The S-II Stage and Apollo Program Quality Assurance Interface Meetings have been concluded after the fourth meeting due to the lack of authority resulting from Apollo Quality Assurance organizational structure at MSC in Houston. Considerable effort is being expended by NASA Headquarters and this Division to refocus the need for such a coordinated effort in Quality Assurance as it affects the single prime contractor and NASA.

D.F.
That's bad. Suggestions?
B

6. SUPPORT OF LAUNCH OPERATIONS CONTRACTS: A team of Quality Assurance Division personnel is currently at Cape Canaveral for accomplishment of a survey of three installation contracts and determine the quality assurance on-site support required at the Cape for the duration of the contracts. Support of these contracts was requested by Mr. Poppel and has been concurred in by Dr. Debus. This on-site support, which is beyond the scope of the current MSFC/LOC agreement, will be provided by mutual agreement of MSFC Quality Assurance Division and LOC. Four personnel are currently scheduled to depart MSFC (TDY) on April 15 for support of these contracts through June 22. Additional support may be required after the survey is completed April 12.

B 4/15

NOTES 4-15-63 GRUENE

Killy Mrazek !! B

1. SA-4 Debris: We were informed that the Carter Cay C-Band Radar observed the separation of an object from SA-4 at approximately 213 seconds after liftoff. This piece was observed for about 6 1/2 minutes by radar. It appeared flat and light to sail with the air movements. No confirmation could be achieved from viewing movies.

139 2. SA-5 Scheduling: Mr. Holmes requested separate day by day schedule for SA-5. M-SAT was informed about this request. Up to now, we have submitted schedules through M-SAT to Headquarters. The dates given for the S-IV checkout in the hangar seem to me over optimistic, but DAC is of the opinion it can be done. ✓

138 3. Wet Test: SA-1D will arrive this afternoon at the Cape for fueling test operations on 37. It will be erected Wednesday or Thursday this week. The S-IV stage will be erected the following day. ✓

4. Reliability Engineer: LVO hired a reliability engineer which will be assigned to the LVO staff. He will be responsible to satisfy any MSFC requests in the reliability field. ✓

B 4/15

NOTES-4/15/63-HAEUSSERMANN

1. SUPPORT OF NASA DESIGN CRITERIA STEERING COMMITTEE, SUBCOMMITTEE FOR STABILITY, GUIDANCE AND CONTROL: (See Mrazek's notes of 4/1/63) Yielding to the pressure of the Design Criteria Committee, I had requested that Mr. Kroh participate in the Subcommittee for Stability, Guidance, and Control, despite Dr. Geissler's and my own opinion that design guidelines in this area are to the greatest extent a specific function of the particular vehicle and mission requirements. Agreed The first two meetings of the subcommittee in February and April have been very disappointing. Mr. Kroh and Mr. Currie, who participated in the second meeting instead of Mr. Kroh, both do not believe that the objectives of the subpanel lead to useful design guidelines; obviously this position is shared by JPL personnel who never attended a meeting, and by Ames Research Center that withdrew participation. For these reasons and our manpower shortage, I intend to limit the support to Mr. Kroh's participation, mainly in order to prevent the development of guidelines which could become an unnecessary burden. ✓ O.K. B

Attached are Mr. Currie's notes on the second subcommittee meeting, and please refer to Dr. Geissler's memo of October 25 with your agreement on paragraph 4. ✓

L.H.

(recurrently !)

I find your NOTES a little meager, compared with the others. I know that big things are happening in ASTR all the times, but your NOTES surely don't reflect it. For instance, today I learned from pure accident, that to assure compatibility between ST-124 and MIT system, you now propose to reduce the 124 from 4 to 3 gimbals. Or the other day I learned from the grapevine that, for lack of space on the IU, you propose to fly early Saturn IB's with two IU's stacked on top of each other.

3 Enc:
Notes of second meeting
Mrazek Notes
Dr. Geissler's memo

Suggestion: Appoint a good man to "case the joint" regularly and put real highlights into your weekly NOTES.

B 4/15

MEETING OF NASA's STABILITY, GUIDANCE, AND CONTROL DESIGN CRITERIA SUBCOMMITTEE, APRIL 2 and 3, 1963, WASHINGTON, D.C.

Impressions I received during my attendance at this meeting concerning the effect of this effort on our program and the possible success of this effort:

1. It was difficult to determine from the conversation with this group the basic purpose for which this design criteria is being compiled. One of the reasons given: This is to be a guide to help NASA Headquarters evaluate future proposals for launch vehicles, satellites, spacecraft, etc., and it was implied that, when compiled, they will be applied as an official NASA system for implementing design of the various systems. The impression was conveyed that the subject matter would be organized by topic and consequently, have a large number of documents in each technical area. For example, it was mentioned in the structural area that they anticipate 200 documents. If this amount of detail is going to be documented and if this design criteria is established as NASA-standards by directives from NASA Headquarters, this could seriously impede our program. Even if the design criteria in their initial issue correctly reflect the present state-of-the-art, in a year or so these would be obsolete and, if we adhere to these guidelines, our progression in the state-of-the-art would be retarded.

2. In my opinion, NASA Headquarters has set up this design criteria effort without adequate planning either in content of what is to be covered, how it is to be organized, the purpose, how and where it is to be updated, and with a rather naive approach that it will be accomplished by merely asking that the Centers assign representatives to the various committees and subcommittees. Also, no thought or provision was evident in the overall planning as to content and format and at what intervals updating of the design criteria would be accomplished.

3. At this meeting it was reported that JPL was absent for the second time in as many meetings and that Ames Research Center had indicated that they were going to withdraw from this particular subcommittee.

4. I stated to the subcommittee that if I had presented a program this vague to NASA Headquarters they would probably tell me to go back home, define what I wanted to do, how I would do it and what resources were necessary, then I could submit an intelligent plan for adoption. I would propose that NASA Headquarters should be equally critical and demanding of programs initiated by their own organizations.

Discuss with Bob Freitag

NOTES 4-1-63 MRAZEK

1. NASA DESIGN CRITERIA STEERING COMMITTEE: The first draft of general guidelines in the environment and structures area will be ready for review by Centers in 7-63. The subcommittes on propulsion and especially stability guidance and control still suffer from too little Center support (not only MSFC). The latter committee deals in a difficult, vast area where traditionally everything is in a state of flux and only very general approaches can be categorized. Mr. Kroh will need more support in the Astrionics Division. The deadline for first drafts is 10-63. All of our MSFC people have worked hard, mostly after hours and at home, and Dr. Bisplinghoff acknowledges this gratefully.

2. STUDY OF REUSABLE SPACE VEHICLES: North American Aviation, Inc. (NAA--S&ID) will add $249,000 of their own money to a $250,000 government (non-profit) contract. Lockheed (California) will add $80,000 of their own money to a $349,000 government (non-profit) contract.

* 3. COST OF LARGE SOLID MOTORS: A study has been initiated to determine more realistic cost estimates for large solid propellant motors. Preliminary analysis indicates that a realistic cost for large solids will be somewhere between $2.00 and $2.30 per pound of motor weight. This includes thrust vector control nozzle, activating mechanism, and transportation to the launch site.

* 4. GEORGIA NUCLEAR LABORATORY: The Atomic Energy Commission's (AEC) operating license expires 4-4-63 with the Air Force lease. General Services Administration will pick up the lease, but doesn't want to apply for the license. All that is required to extend the license is for the facility "owner" to apply. The Air Force, Corps of Engineers (agents for the Air Force), General Services Administration, and AEC all refuse to apply for the license as owner. A meeting was held 3-29-63 in Washington to try to straighten this out. If not successful, Lockheed must start on 4-2-63 to disassemble the reactor for storage.

5. SEAMANS' BRIEFING: The briefing reported on 3-25-63 will be postponed until after the scheduled meeting between you and Harry Finger on 4-22-63.

* 6. MECHANICAL DESIGN INTEGRATION WORKING GROUP: The Mechanical Design Integration Working Group held a meeting with North American Aviation, Inc. (S&ID) and Douglas Aircraft Company on J-2 engine performance, insulation, stratification, recirculation and pressurization problems. To assure safe flight of the early vehicles, changes to the S-II and S-IVB stages are required. The contractors have been directed to proceed with these and to assure that most or all of the additions can be removed after the first three or four flights and/or when better test data are available. Action items from the meeting are shown in attachments #1 and #2.

Attachment #1: Memo No. M-P&VE-VH-137
Attachment #2: Memo No. M-P&VE-VH-142

Let's get Cannes under!

B 4/4

See below

L. Hamrock. Please help. B

H.H. Koelle How do you tie into these studies? B

P&VE NPSH's lighter than expected, eh? B

GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

1) Aero – DIR
2) Astr – DIR
Agree 100%

Memorandum

TO See Distribution

DATE October 25, 1962

FROM Director, Aeroballistics Division, M-AERO-DIR

SUBJECT Meeting on Role and Activities of the Design Criteria Steering Committee

13 NOV 1962

M-DIR, Dr. von Braun

1. Reference is made to memorandum of September 18, 1962, above subject, from Mr. Hellebrand, M-P&VE-DIR, which gave some results and conclusions of a meeting which took place at MSFC on September 18, 1962, between Mr. R. V. Rhode, Assistant Director, Space Vehicles Office, NASA Headquarters and several representatives of MSFC. A few additions and corrections to this memorandum appear desirable to give a complete picture of the results of the discussions.

2. Subject meeting was held shortly after a lengthy discussion of the Design Criteria Steering Committee in an MSFC Executive Meeting and after a letter had been sent to Mr. Thomas Dixon by Dr. von Braun. This letter which had come to the attention of Mr. Rhode, emphasized that the activities of the committee should be concentrated on the fundamentals involved and the establishment of basic guidelines. It also pointed out that final design criteria should be established by the Center having development responsibility for the particular vehicle system.

3. In subject meeting, Dr. Geissler explained that the basic concern of MSFC management was the avoidance of a situation in which an additional committee structure would establish binding guidelines, not benefitting from thorough coordination and concurrence of existing intra-center and inter-center committees. It was emphasized that a compilation of basic facts and general guidelines would be very welcome in some cases (e.g. structures, materials, external environment) whereas in other areas there was no evidence as yet of the need for such activities. Mr. Rhode stated that he understood the viewpoints of MSFC and that part of the concern was probably caused by semantics difficulties (the phase "design criteria" is ambiguous.)

RECEIVED OCT 30 1962 M-DIR

NASA - Form 488 (August 15-6)

SUBJECT: Meeting on Role and Activities of the Design Criteria Steering Committee — October 25, 1962

4. Dr. Geissler stated that both Astrionics Division and Aeroballistics Division had considered the question: "What activities should be undertaken by the proposed subcommittee for "Stability, Control & Guidance ?', and that neither organization had been able to identify problems or questions on design guidelines which would justify the creation of such a subcommittee. It was pointed out that nomination of representatives for this subcommittee could be made only if a reasonable understanding of the assigned tasks were available, and that so far no one had presented any significant problems. Consequently, Dr. Geissler suggested that creation of a "Stability, Control and Guidance Subcommittee" be postponed until a reasonable enumeration of critical areas requiring such committee activity were made known.

Geissler

E. D. Geissler

CONCURRENCE:

W. Haeussermann

W. Haeussermann
(Concurrence applies to paragraph 4 only.)

Distribution:
Dr. von Braun, M-DIR
Dr. Rees, M-DIR-R&D
Mr. Maus, M-CP-DIR
Mr. Andressen, M-CP-DIR
Mr. Vaughan, M-AERO-G
Mr. Mrazek, M-P&VE-DIR
Mr. Palaoro, M-P&VE-V
Mr. Hellebrand, M-P&VE-DIR

B 4/15

NOTES 4/15/63 HEIMBURG

1. SOUND SUPPRESSION TEST STAND (H-1 ENGINE):

First firing of H-1 engine on modified "Hop Stand" with dry deflector to establish basic sound levels planned for end of this week. ✓

2. MTF:

NASA Headquarters approved Procurement Plan for MTF Saturn V Technical Systems. RFQ package will be released by M-P&C as soon as the conditions of the plan approval have been received and evaluated. ✓ I understand AETRON approval has been given for Phase I only! B

3. S-IV-DAC, SACTO:

a. BATTLESHIP - Planned full duration firing on 4/11 cut off at 437 seconds because of water supply depletion. All other systems satisfactory including helium heater. Full duration firing completed Friday, 4/12. Engine No. 1 cut out after first 20 seconds, as planned. Helium heater out last 100 seconds. All objectives met. Next firing scheduled Wednesday, 4/17. ✓✓

b. ALL-SYSTEMS - Nothing new to report from our side for this period. Next filling week of 4/22/63. ✓

c. S-IV-5 PREPARATION - About 80% of the GSE has been delivered, but not installed. ✓

4. MARINE ACTIVITIES:

Barge PROMISE arrived Fort Pierce, Florida, 5:30 a.m., 4/14; due at Cape Canaveral, 2 p.m. today, 4/15. Voyage trans-Gulf without incident. Vessel scheduled to depart Cape, 4/16, for drydock in New Orleans to be equipped with anti-roll tanks. ETA MSFC, approximately 5/14/63. ✓

they not go first class, eh? B

B 4/15

NOTES 4-15-63 HOELZER

No report.

NOTES 4-15-63 HUETER

B 4/15

1. LUNAR PAYLOADS: Synopses of proposed studies in this area were handcarried to OMSF on April 7. These were reviewed by OMSF (Mr. Taylor's Office) together with Marshall representative (Mr. Schaefer). As a result of this review, OMSF will now request approval from Dr. Seamans for some 1.95 million dollars of FY 63 funding. This is only some twenty thousand dollars less than that initially recommended by Marshall so, essentially, all the MSFC recommendations were acceptable. Statements of Work for the proposed studies have been prepared and will be handcarried to OMSF for review on Tuesday of this week. It is anticipated that OMSF approval of Work Statements and approval for expenditure of FY 63 funding can be obtained and RFQ's issued by May 1.

H H. Please let me see these occasionally B

2. MULTI-MISSION MODULE: An interim meeting relative to the advantages of one versus two engines for the Multi-Mission Module was held this past week. At this time in the evaluation, indications are that the two engine configuration provides greater advantage. The total evaluation will be published in a separate memorandum.

NOTES 4-15-63 Koelle

B 4/15

1. REUSABLE LAUNCH VEHICLE STUDIES

Last week, Dr. Mrazek referred to a NAA and Lockheed contract on the orbital passenger ferry, pointing out that we have been able to negotiate very favorable contracts. You raised the question what relation my office has to these contracts. As a matter of fact, these two are FPO contracts. They are part of our overall program. The technical supervisor of these two contracts, however, is Mr. Fellenz from P&VE. We fall back on the support of the line divisions wherever we find a taker. These two contracts are a very good example of how a project office should work with the line divisions. I believe everybody is happy and we have developed good efficiency on this project. ✓

2. HUMAN FACTORS

We have one study project entitled "Human Factors Design Handbook" with emphasis on orbital maintenance and repair. MSC has made a strong bid to Headquarters to take this over at this time, in spite of the fact that they declined it in the beginning, when it was offered to them. We are willing to let this go, quite reluctantly however, but they have some good arguments in their favor. This is the second case where a study, originated by us, is taken over by MSC. We have to watch out that the MSC and Headquarters termites do not get into our program too strongly. Therefore, we are drafting a letter to Dr. Bisplinghoff for your signature, indicating that we have to acquaint ourselves also with the "Human Factor" problems of space flight and that we want to be part of the team. This letter is also supposed to serve notice to MSC (in kind but firm words) that they will find it increasingly more difficult to take over our study contracts.

HHK
Meantime, we landed lunar surface program at MSFC. Tit for tat! B

HHK
Coordinate with Hueter. One good reason is our work on lunar shelter and rover. B

3. WORKING GROUP ON COSTING PROCEDURES

Last week we had a visit from Jeff Barber and two associates (Office of Programs, Headquarters) on the subject of better cost estimating for future projects. Mr. Webb and Dr. Seamans are increasingly worried about the situation. It is expected that Dr. Seamans will soon appoint a study group on this subject and invite MSFC to participate. I propose, therefore, that we create a little study group of our own with the three project offices and Central Planning Office participating, in order to take stock of the situation and prepare ourselves to cooperate in a NASA-wide working group. - ACTION -

HHK
Please discuss with Mrazek and submit a plan B

NOTES 4/15/63 KUERS B 4/15

1. Saturn I, S-I-5: Modifications and repairs on SA-5 after static firing necessitated operations on two 10 hour shifts in the assembly shop during the last week. In spite of this effort we are two days late in delivering the stage to Quality Assurance Division for final check out prior to shipment, due mainly to the required improvement and repairs to the lox pressurization system inside the 105" container.

2. Saturn V, S-IC:

In a meeting with Boeing at Michoud with Dr. Constan's people, Saturn Systems Office and Quality Division participating we discussed structural fabrication and structural assembly operations peculiar to Michoud. Agreements were reached in several areas, but we had to direct Boeing to change their planning in the area of optical alignment of the structure and in the method of laying the structure down from the vertical to the horizontal position. The optical alignment was completely eliminated since checks on the plane levels can be made by much simpler means. The structural assembly does not require such an elaborate optical control either. If the major sub-assemblies (thrust structure, fuel container, etc.) are within specified tolerance the stacking of these sub-assemblies cannot produce a worse result than adding up of tolerances. Quality Division is in complete agreement with us. As to the lay-down procedure we eliminated a special fixture, called the skate dolly, which is estimated to cost between $200,000 and $300,000. Boeing will make a new study for this procedure using the overhead crane and a second hoist in a similar way as erection and lay-down is accomplished at the static firing test stand and the launch site. This method is much cheaper and utilizes the same pick-up points and hoisting gear as at Test Division and LOC.

After modifications of our Gore Trim Fixture and Meridian Weld Fixture we succeeded in making the first meridian weld on the bulkhead. X-ray evaluation of the weld revealed some porosity requiring repairs. Since we believe to know what caused this deficiency we can go ahead now in welding of the bulkhead. The bottleneck is now the outlet fitting welding and delivery of the manhole outlet from Boeing.

Indications are that some management improvement has occurred at Arrowhead; however, it is too early to predict any impact on schedule.

3. Saturn V, S-II: The gore segment fabrication by explosive forming is making progress. The second apex test part was fired, solution heat treated and fired again to contour with a very small distortion in one area, which can probably be removed during aging. The second waffle (base) test segment was also formed explosively still resulting in some distortion which has been partially removed by refiring with smaller charges located over distorted area.

Notes 4-15-63 Lange B 4/15

1. SATURN I: S-IV Battleship - A successful firing for 437 seconds was conducted on 4-10-63. All systems operated satisfactorily until a facility water pump went out of commission and required stage cutoff. ✓

2. SATURN IB: Preliminary review of Chrysler's redesign proposal (rec'd 4-12-63) indicates that evaluation will be difficult because much material not related to the program is included. ✓

3. SATURN V: S-IC - Formal negotiation for Mod. I is scheduled for week of 4-22-63. ✓

Pre-sculptured versus post-sculptured versus chem milled gore segments. The later show most promise to meet schedules. Ryan Aircraft has adequate facilities and is already under contract to chem mill segments. ✓

P&VE proposal to make F-1 engines interchangeable is being studied. Indications are that further delay in design release and hardware deliveries will be involved. ✓

Propellant ducting hardware - A second source (Flexonics) is being set up on the most critical items. MSFC is assisting Arrowhead in procuring critical materials for ducting. ✓

S-II - Next Quarterly Review is tentatively scheduled for 5-14-63 at S&ID. ✓

As of 4-11-63, S&ID has not successfully produced a thin gore section for the common bulkhead. It is anticipated that a parallel effort of stretch forming will be initiated, if a gore is not successfully formed by the high-energy method by mid-April. ✓

O.L. In Sacramento? Please send me description & sketch B

Contract for acquisition of equipment and initial design and construction of the Attitude Control Module Development Test Site was signed by DAC on 4-10-63.

S-IVB-DAC informally advised M-SAT that a three-month delay in ground test stages and initial SAT IB flight stages will be required to redesign the LOX and LH_2 tanks as requested by the Mechanical Design Integration Working Group. This will be discussed with P&VE prior to redesign authorization. NPSH problem? B

4. APOLLO: EDS - Except for two items, agreements with MSC have now been finalized as follows: 1. Automatic abort on angular overrates (IU) ✓ 2. Astronauts' displays of engine status (lights), tank pressures in both stages (analog gages). ✓ 3. Disputed Items to be finalized shortly - Automatic abort on normal acceleration (for slow turn over) and on 2-engines out. Understand. O.K. B

Spacecraft (Boilerplate)- Arrived last Monday for dynamic tests. ✓

GE - has made for us a nation-wide review of launch vehicle man rating efforts; report is being reviewed. ✓

Micrometeorite Experiments - Coordination with MSC is progressing satisfactorily. ✓

Gemini - Titan II - We are planning to invite members of MSC's Gemini Project to brief you on Gemini-Titan progress.

O.K. Lay on with Bonnie B

B 4/15

NOTES 4-15-63 MAUS

1. THIRD SYSTEMS REVIEW MEETING. Dr. Shea's office has advised that this meeting will not be held on April 25; new date has not been established. ✓

2. MANPOWER. We have received authority from NASA Office of Programs to hire 280 summer students; our request was for 300 spaces. We also have received advance commitment authority against our FY 64 allotment, to hire 100 permanent persons in July and 100 in August. ✓

13 3. BREAKDOWN OF AIR FORCE LH_2 PLANT. The AF LH_2 plant at West Palm Beach, which broke down April 7 resumed production Saturday, April 13. ✓

4. NEW PROJECT STARTS. When OMSF made recommendations to Dr. Seamans on new project starts to be included in the preliminary FY 65 budget, they listed the Multi Mission Module under OSS instead of OMSF. Mr. Holmes feels that this program should definitely be under OMSF, and as of last Friday, Holmes had resubmitted it to Office of Programs under OMSF. ✓✓

Also, we understand that Mr. Holmes considered the initial funding requested for OMSF project starts too low, and has upped the figures as shown in fourth column below:

	OMSF February 27 submission			Approx Increase
	FY 64	FY 65	Program Total	
LEM Truck	34M	66M	138.3M	30%
Early Manned Space Station	40M*	172M	148.2M	20%
Multi Mission Module	15.9M	37.6M	114.3M	20%

*In the meantime, OMSF has decreased the FY 64 requirement for starting the Manned Space Station project from 40M to 10M.

The percentage increases apply to the program totals and we assume to the FY 65 funding level also. Details of these changes should be available to us this week. ✓

H.M. Looks much better. Want to tell Hueter? B

NOTES 4-15-63 MRAZEK

B 4/15

1. LOCKHEED REORGANIZATION: A new Lockheed division, The Research and Development Division, has been established. The new division is headed by Mr. Elmer P. Wheaton with Dr. J. P. Nash as his assistant. Concurrently, Dr. Roy Smelt succeeds Mr. Wheaton as Vice President and General Manager of the Space Programs Division. Dr. Hal Plank moves up to head of the RIFT project group which is now called "Nuclear Space Programs," having lost division status.

Hardly surprising!

2. SINGLE-ENGINE MMM (MULTI-MISSION MODULE) DRAWBACKS: As a result of a brief analysis comparing the single-engine MMM concept with the two-engine concept, it was found that the single-engine concept would probably be less acceptable.

3. OMSF DIRECTIVE M-DE 8000.004: Office of Manned Space Flight Directive M-DE 8000.004, "Interim Control and Design Goal Weights," dated 3-1-63, embodies a basic management philosophy, the acceptability of which has to be established at MSFC.

"It shall be the responsibility of OMSF, in coordination with the centers, to establish, monitor, and reallocate as required, control weights for each vehicle control point." (NOTE: A control point is a portion of the vehicle in which a control or design weight is established such as S-IC stage, S-II stage, S-IC/S-II interstage, etc.)

W.M. I think this is acceptable. Unless they can swap, all that weight policing doesn't make much sense. We can always dig in and veto! B

4. S-I/SA-4 FLIGHT EVALUATION: A detailed evaluation of the SA-4 propulsion system shows the flight test was successful and all assigned missions were accomplished. The engine-out condition presented no problems; no adverse effects were noted on any system.

5. PROPELLANT TANK PRESSURE SCHEDULE CHANGE: A recent analysis of the propellant tank pressure schedule for the S-IVB stage showed the tank pressures inadequate to assure minimum engine NPSH (Net Positive Suction Head) during flight. In a meeting between MSFC and Douglas Aircraft Company, it was decided that the tank pressure for initial flights must be increased. The new tank pressures will require a redesign of the tanks which may cause a schedule slip. → 4 months

W.M. See Gruene's NOTES of 4/15! B URGENT

W.M. I understand!! What happened here? And can we live with that extra weight? B

6. S-II STAGE PROPELLANT UTILIZATION SYSTEM: It was decided in a recent meeting that the closed-loop propellant utilization system for the S-II stage would be retained for SA-504 and subsequent. The closed-loop system in conjunction with a step in engine mixture ratio and thrust offers a significant payload advantage of approximately 2,000 pounds.

7. TRANSFER OF S-I DOCUMENTATION: Seventy-two percent of the total Propulsion and Vehicle Engineering Division drawings (Astrionics Division excluded) have been transferred to Chrysler. Of the remaining twenty-eight percent only a small amount, which is applicable to the S-I stage, will have to be transferred.

8. SATURN V MECHANICAL GROUND SUPPORT EQUIPMENT: To insure that all needs are met, an overall vehicle mechanical ground support equipment matrix will be prepared with temporary personnel assignment at Huntsville from all stage contractors.

NOTES 4-15-63 Rudolph B 4/15

Flight Mission Assignments:

A revision to the Flight Mission Assignments Document, previously issued on February 14, 1963, will be released by Wednesday, April 17. Contents of the revised issue were reviewed with Saturn Systems Office and were generally acceptable.

An updated set of slides will be provided to you. ✓

B 4/15

NOTES 4-15-63 WEIDNER

1. F-1 ENGINE: Three more full-duration tests have been conducted with engine 009. This brings the accumulated number of mainstage seconds with this build of injector (flat-face 5U with partial feed system isolation) close to 2500 seconds. The injector has not experienced any surface erosions but has been showing hairline cracks between some LOX triplet orifices. One experimental injector (low Delta-P) recovered after being shocked by a 13.5-grain bomb. This could not be repeated in subsequent tests.

Dr. Crocco's visit was well received at Rocketdyne. He suggested some further potential improvements to our injector designs with regard to relative arrangement of fuel and LOX injection fans. The poor fellow became ill during his stay out there and was confined to his motel room for one full week. We will write him a "thank you" letter for you to sign. This appears to be especially indicated since we have not yet been able to get him on our payroll. !!

H.W. Feasible?? By all means! B

Funds required to fabricate the urgently needed replacement flame deflector (Stand 1-B) have been received.

We have a proposal from Rocketdyne suggesting contractual recognition of additional $14 million injector development work beyond the scope of the basic contract. It appears to me that in principal they have a valid argument since nobody could have foreseen the actual magnitude of effort required. The exact figure, of course, has to be determined by negotiations. You might want to take this rather delicate matter up with Freitag and Holmes. I will be available to brief you. Let's do it while Freitag is here (4/16 and 4/17).

URGENT

2. J-2 ENGINE: All three test stands were in operation. Thirteen engine system tests were conducted this week.

The Component Test Laboratory (fuel turbopump development area) has been down for the past five weeks to add a new hydrogen burn-off stack and make duct routing revisions and repairs. At least two more weeks will be required to complete these modifications.

3. S-IV BATTLESHIP TESTING STATUS: A 437-second hot firing was conducted on 4-10-63. The test was intended to go to propellant depletion but was aborted because of indicated depletion of the cooling water to the engine diffusers.

4. DOUGLAS S-IV ALL-SYSTEMS VEHICLE COLD-FLOW TESTING STATUS: On 4-9-63 a second attempt was made to run a cold-flow loading test. The test was aborted when two areas of indentation occurred on the cylindrical portion during initial loading of LH_2. This left several wrinkles in the outer skin and cracks in the internal insulation.

NOTES 4-15-63 Stuhlinger B 4/15

1. METEOROID MEASUREMENT PROJECT: The relationship between Fairchild and Schjeldahl (who will sub-contract to produce the detector for the meteoroid measurement capsule) now seems to be straightening out. Mr. Grau will provide a man at Schjeldahl for in-process inspection and quality certification. This protects their proprietary information. The project appears to be in good shape. Division support and LOC-LVOD support remains excellent. ✓

2. METEOROID HAZARD EVALUATION MEETING: RPD, Aeroballistics, and P&VE participated in a Meteoroid Hazard Evaluation Meeting at OART on Tuesday, Wednesday, and Thursday of last week. Marshall appears to have as good a program of research in the areas leading to vehicle protection as has been formulated anywhere in NASA. We are assured continued support from OART. There is some danger of duplication with the MSC program and our support from OMSF probably will continue to be limited. ✓

3. FY-63 SUPPORTING RESEARCH PROGRAM: The status of the FY-63 MSFC Supporting Research Program is as follows:

	AUTHORIZED	COMMITTED	BALANCE
OART	6,509,500	6,259,820	249,680
OMSF	6,050,000	5,816,224	233,776
ADVANCED SATURN C-5	3,800,000	3,778,254	21,746
	16,359,500	15,854,298	505,202

✓

4. GRADUATE STUDY PROGRAM: The University of Alabama is in the process of negotiating with the Army for a contract for the coming year's graduate program in Huntsville. The amount of money being discussed is of the order of $300,000. ✓

5. COSPAR PAPER: A paper on meteoroids by Drs. Shelton and Hale, and Mr. Stern of RPD has been accepted for presentation by Dr. Shelton at the COSPAR meeting in Warsaw, June 3-11. The paper deals with the analytical treatment of mono-directional and isotropic particle sources in the presence of the earth's gravitational field and as observed by a moving detector.

6. RPD BUILDING: During RPD's Director's Review presentation to E. Rees, H. Gorman, H. Maus and others on April 4, E. Rees suggested that the subject of the proposed new laboratory building for RPD should now be brought up in the Executive Session for final discussion. We are presently writing a "fact sheet" for distribution before this discussion. May I have a half-hour of your time to brief you on this subject before the Executive Session?
Action Required. E.S. Yes B

7. STERILIZATION OF SPACECRAFT: Representatives of RPD, Quality, and P&VE attended a meeting last week in Washington at the OSS Lunar and Planetary Program Office on sterilization of capsules for Mars and Venus probes. All centers are invited to participate in the technology of developing materials, components, etc., that will be capable of withstanding the heat necessary to sterilize the components and capsule. It now appears that Dr. Lucas' group (P&VE) will probably have the bulk of the work in this area. ✓

April 22, 1963

NOT FOR FURTHER
DISTRIBUTION

Excerpt from notes of 4/22/63

NOTES-4/22/63-HAEUSSERMANN

1. USE OF GULFSTREAM AIRCRAFT: We understand from Mr. W. P. Morrow, M-SS-V, that the use of the Gulfstream is limited to yourself and your staff officers. We suggest that its use be widened to include group travel to committee and working group meetings. Invariably our key engineers are active participants in such meetings and we find that their time is always over committed. The speed of the aircraft and the schedule flexibility offers considerable advantage to our key engineers participating in group meetings held within a reasonable range of MSFC. The use of the aircraft as suggested would enable them to more effectively use their time (minimizing time spent in travel status) and would, in addition, have a morale boost factor to offset strained conditions brought about by heavy technical work loads and increased administrative burdens.

Mr Newby called from the West Coast and asked that Mr. Foxworthy see this extract. Dr. von Braun was upset about this statement by Mr. Morrow because he had already asked that a policy be put out on the subject. Mr. Newby suggests that the "policy paper" be put out as soon as possible.

Policy statement discussed with Mr. Norman by Davis Foxworthy.

B 4/22

NOTES 4/22/63 CONSTAN

1. REINSPECTION OF S-1-8 TANKS

As a result of the difficulties found on harness and probes in S-1-5 tanks, a reinspection of S-1-8 tanks was initiated on April 19, 1963, and is expected to be completed by April 30, 1963.

2. TUBE FLARES

CCSD is now producing very good tube flares, but to date have been unable to meet the requirements of MC 146. The point has now been reached where either fabrication should cease or the specification should be relaxed. Since it is doubtful, the contractor will be able, in the foreseeable future, to comply with this specification 100%, a waiver is not considered the proper approach. This problem has been coordinated with M-QUAL, M-P&VE, M-SAT and M-ME. Efforts will continue to effect a resolution.

3. GOVERNMENT FURNISHED PROPERTY

The S-1-8 engines are scheduled to be delivered to Michoud during the first two weeks of May. The S-1-10 engines are scheduled to be delivered during the first two weeks of August.

NOTES 4-22-63 FORTUNE B 4/22

1. Movie on Mississippi Test Operations: After discussion with Harry Gorman, I reviewed our proposed movie with Bart Slattery. You may recall that the script opens with Senator Stennis introducing himself, followed by a minute and half speech, then he closes the movie with another 30 - 45 seconds of discussion. Because of the political implications, I do not think that we should put all this emphasis on Senator Stennis alone. It would be better to open the film with the Senate Space Committee in a group, if we could, and then perhaps give Stennis 30 seconds at the end. Barnett is going to give Stennis quite a tussle in the Senatorial Campaign. While we all personally favor John Stennis, I do not feel we can give him such open, patent support. Agree B

Film cancelled pm ↑ O.K. B

2. AGARD General Assembly in Athens, Greece: After discussion with Dr. Frank Wattendorf, Technical Director of AGARD, Colonel Floyd Sweet of NASA Headquarters staff told me that the Assembly's specific purpose is helping Greece set up a short missile range of 100 miles from Crete for strictly military purposes; therefore, I do not feel that it appropriate that MSFC present a paper there. Dr. Wattendorf knows of our interest, however, in space related subjects, and he will probably issue us invitations to participate in the future. ✓

Eberhard Mac F.y.i. ! B

3. Meeting with Senator Stennis: Last Thursday Bart Slattery, B. U. Jones, and myself called on Senator Stennis. We reviewed the ground-breaking ceremony which he said he could not attend because of the press of business in Congress; also, the General Electric support contract, about which he said he would write to Mr. Webb, to make sure Mississippi firms receive adequate sub-contracts. We also discussed Coast Electric power line acquisition. Contrary to his promises to me, Mr. Shattuck did print a rather inflammatory article about the poor deal he was getting from the Government. At the same time, the Corps of Engineers was doing everything they could to give him a fair break. Senator Stennis stated that he wanted Shattuck to get everything he was legally entitled to; however, he expected the Corps of Engineers to fully know all legal aspects of the case, and not go further than the law allowed. Dr. Colverd, President of Mississippi State University, has invited Mrs. Fortune and myself to join the Colverds and Senator Stennis for breakfast at State College next Saturday morning. ✓

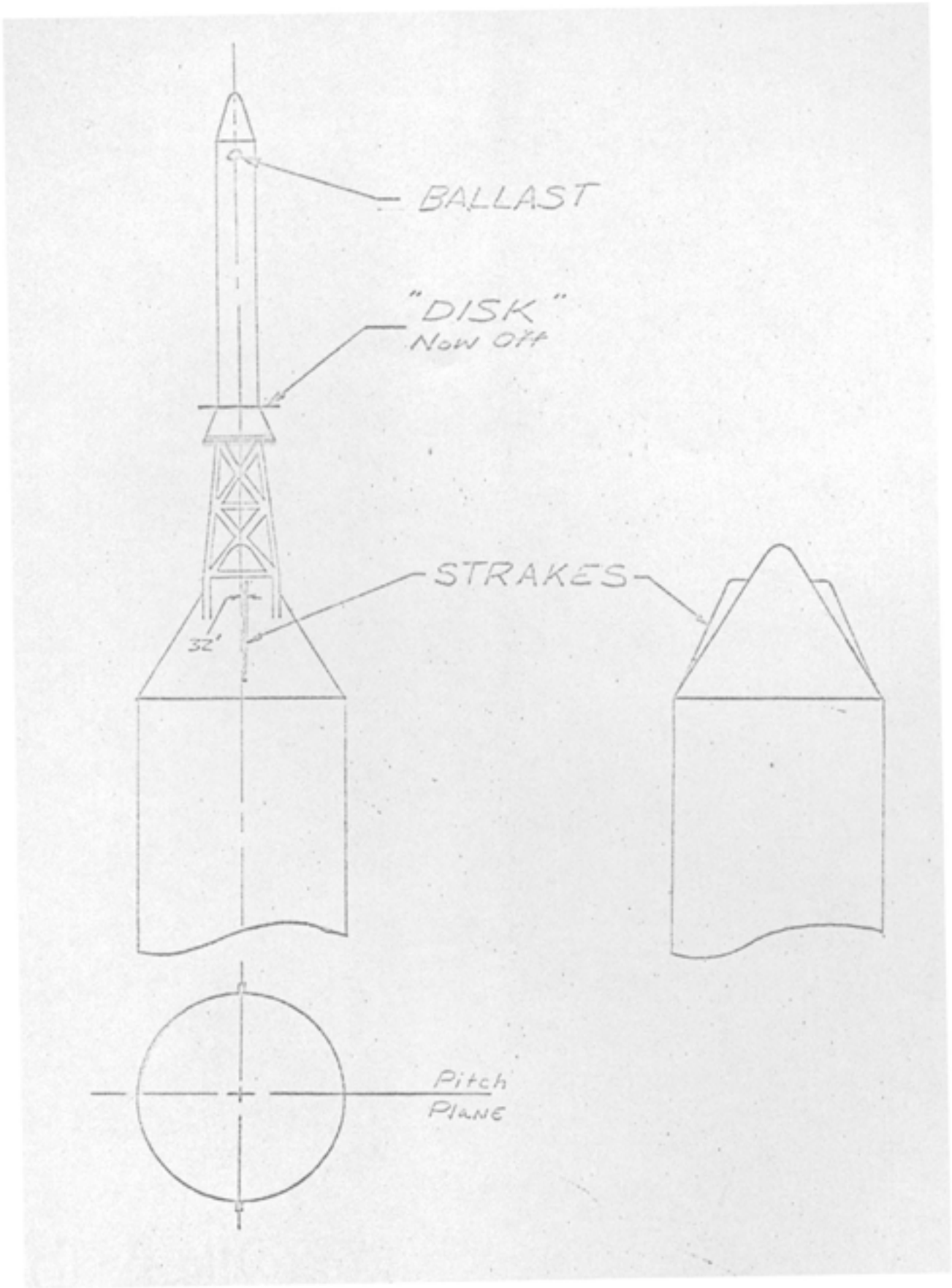
* pm

NOTES 4/22/63 GEISSLER — B 4/22

1. Strakes on Apollo Command Module: Because of good working relations with our wind tunnel counterparts at MSC, we had sufficient advance notice to incorporate the strakes on the ground wind model at Langley. Also, all other models have been modified to incorporate the strakes, and testing is in progress. In general, the strakes are of little, if any consequence on total vehicle aerodynamics.] The following is a brief history on the evolution of the Apollo "strakes," in response to your inquiry: In order to provide aerodynamic stability for abort using the LES, the addition of a flow separator disk at the base of the escape motor was conceived. This was an aerodynamic fix due to an unfavorable center of gravity location for the LES-command-module-combination. As internal capsule design progressed, the command module center of gravity moved forward to where, around February this year, the flow separator idea was abandoned in favor of a small ballast at the LES tip. However, the new center of gravity location was such that if abort occurred after LES jettison the command module might re-enter rearward first, and it would remain stable in this position. An aerodynamic fix was therefore necessary to prevent improper attitude during re-entry. Thus the strakes were added, and this is their only purpose. The strakes are a pair of narrow, finlike lifting surfaces, canted approximately 1/2 degree as shown on the accompanying sketch. ✓

2. SA-4 Flight Evaluation: An SA-4 flight result presentation will be made to the Board on April 26, 1963 by Dr. Speer. ✓

3. Headquarters Instrumentation Requirement Working Group: Mr. Schwartz, MLV, requested a discussion on future MSFC instrumentation requirements from Goss (Ground Operational Support System). Mr. Hoberg and Dr. Speer participated. Schwartz agreed with our plan to generate the required documents jointly with MSC and LOC (Mission Control Operations Panel). ✓


BALLAST
"DISK"
Now Off
STRAKES
32'
Pitch
Plane

NOTES 4-22-63 GORMAN B 4/22

Negative

NOTES 4-22-63 GRAU B 4/22

1. S-I-5 POST-STATIC CHECKOUT: Cleaning and/or replacement of the liquid level sensor adapter cable branches was completed on all tanks and accepted. The stage was moved into the pressure cell, Building 4705, for Final Pressure and Functional Tests on April 17, 1963.

2. S-IV-5 VEHICLE: The S-IV-5 vehicle will arrive at SACTO on April 20, 1963. Delays in the testing of the All-Systems vehicle at SACTO will prevent the S-IV-5 vehicle from getting on the test stand for about two weeks. During this period, the S-IV-5 vehicle will be placed in the hangar for further modification which was not accomplished at Santa Monica.

Checkout teams from Quality Assurance Division will cover the S-IV-5 at SACTO and the S-IV-6 at Santa Monica.

Regarding your question on Notes 4-1-63 GRAU (copy attached), we propose that, 1. all changes and modifications required to put the S-IV-5 stage in order be accomplished prior to further testing, 2. the all test and checkout procedures be approved prior to putting them to use and 3. that the stage be completely checked out and in "flight ready" condition before release for shipment from SACTO to AMR.

3. S-IV-5 QUALITY ASSURANCE SUPPORT: Considerable Quality Assurance Division support has gone into our DAC effort on the S-IV-5 stage checkout. In addition to eight permanent personnel at DAC-Santa Monica and two at DAC-SACTO, a total of eighteen individual trips were made to DAC-Santa Monica in direct support of the factory checkout, with some of these visits lasting as long as four weeks.

4. PROJECT 60 SUPPORT CONCLUDED: Activities associated with the Department of Defense Project 60 have been concluded. The final report of Sub-Task Group #1 (Inspection/Quality Control) was signed off by each member and presented to the Lead Task Group. This report was one of thirteen received by the Lead Task Group for compilation into a final report on the subject of Contract Management for presentation to the Secretary of Defense.

5. QUALITY ASSURANCE ORIENTATION: In the past several months, personnel of this Division have made presentations on the NASA-MSFC Quality Assurance Program to MSFC Project Offices and Divisions. Among them were presentations to the former L&M office, segments of SSO, P&VE Division, Astrionics Division and the Launch Support Equipment office of LOC. The presentations were well received and encouraging enough to warrant further effort in this orientation program.

1 Enc:
Attachment 1

NOTES 4-22-63 GRUENE B 4/22

Fueling Tests on Pad 37: You doubted that we would be ready with the facilities for beginning these tests. The S-1 stage was successfully erected on April 19th and the S-IV stage on April 20th. Three of the four large fins on the S-1 were also installed. We used a makeshift solution, but will have a permanent change made soon. ✓

NOTES-4/22/63-HAEUSSERMANN B 4/22

1. USE OF GULFSTREAM AIRCRAFT: We understand from Mr. W. P. Morrow, M-SS-V, that the use of the Gulfstream is limited to yourself and your staff officers. We suggest that its use be widened to include group travel to committee and working group meetings. Invariably our key engineers are active participants in such meetings and we find that their time is always over committed. The speed of the aircraft and the schedule flexibility offers considerable advantage to our key engineers participating in group meetings held within a reasonable range of MSFC. The use of the aircraft as suggested would enable them to more effectively use their time (minimizing time spent in travel status) and would, in addition, have a morale boost factor to offset strained conditions brought about by heavy technical work loads and increased administrative burdens.

Dr. Haeussermann, See Mr. Gorman. I do not think this is true. W.H. Gom

This is plain, unmitigated baloney. Of course is the Gulfstream available for group travel!

2. MECHANICAL FEEDBACK SERVOACUTATOR DEVELOPMENT FOR S-2: Reference your note to Item 1 of 4/8/63 Notes (copy attached). An important consideration in having S&ID develop a mechanical feedback servoactuator is the standardization achieved, since the S-IC and S-IVB servoactuators will have mechanical feedback. Mechanical feedback improves reliability by eliminating the command voltage supply, four electrical leads to each feedback potentiometer, the potentiometer and electrical circuitry within the servoamplifier. With this design it is possible to test the servoactuator dynamically without the need for flight type control computers since the servo system dynamics are determined within the servoactuator closed loop system. Concurrent with the introduction of this system, two-wire input to the servovalve and improvements in contamination tolerances have taken place. ✓

3. SPATIAL ATTITUDE MOTION SIMULATOR: Our R&D efforts have come practically to a stand-still in the last months because of manpower shift to more urgent areas.

Harry Gorman with whom I've discussed this, promised a put out a paper on procedures to be followed to use it. B 4/22

4. YOUR NOTE ON WEEKLY NOTES OF 4/15/63: (Copy attached) To avoid burdening you with half-cooked items, I prefer to inform you about areas where Astrionics needs your direct help or about final results of our efforts. Actually, I learned about P&VE's intention to stack one IU on top of other on early S-IB flights after you had heard about it; in the meantime I have taken action to reduce the number of passenger components in order to accommodate them in one IU. With respect to the other example, the ST-124-M version for Saturn IB/V, we are still in the process to finalize the necessary modifications. We intend to give you a presentation in 1 to 2 weeks. ✓

2 Enc:

1. Notes of 4/8/63
2. Notes of 4/15/63

B 4/22

NOTES 4/22/63 HEIMBURG

KH

1. MTF:

Slight modifications are being made on the MTF Saturn V Technical Systems procurement plan for Phase I to fully comply with conditions of approval by NASA Headquarters. The RFQ package should be released to Aetron by M-P&C this week (re. NOTES 4/15, Attachment 1, you are right, AETRON approval has been given for Phase I, only). ✓

Bell package taken off? B

NASA Headquarters approval of MTF cryogenics procurement plan not received. Location of plant remains as sole problem to be resolved. ✓

Office, Chief of Engineers has approved Air Products & Chemical Corporation as selected source for design of MTF propellant and high pressure gas facilities and barges. RFQ to be released by Mobile District Corps of Engineers with contract to be finalized during early May. ✓

FY-64 facility planning and design funds have been received for F-1 Engine System Test Stand, Maintenance Facilities, Transportation and Parking Facilities, and Waterways and Docking Facilities. ✓

2. S-IV-DAC, SACTO - BATTLESHIP AND ALL-SYSTEMS:

Full duration (465 seconds) successfully completed on 4/19. Simulated cold helium regulator failure. Obtained LH_2 loading data on battleship for use with all-systems. All systems insulation repair to be completed today, 4/22/63. ✓ Propellant loading testing planned, 4/25 and 5/5/63. ✓

S-IV-5 encountered rough weather near Santa Barbara and should arrive in Sacramento today, 4/22/63. ✓

3. SOUND SUPPRESSION TEST STAND:

Test SS-01 was conducted, 4/19, for a duration of 3 seconds of mainstage. The purpose of the test was to check out the facility and engine prior to sound level testing on dry deflector. Facility and engine checkout were satisfactory. Two tests are planned for Tuesday, Wednesday, and Thursday of this week to obtain a baseline level of sound. ✓

4. S-I-6:

S-I-6 will be installed in the Static Test Tower today and checkout preparations started. Short duration firing tentatively planned, 5/16/63. ✓

5. NEW GRAND HAVEN STATUS:

Re NOTES 4/8/63, Attachment 2. Answer to your question on NEW GRAND HAVEN status; covered during meeting last week with Capt. Freitag, et al. ✓

ATTACHMENT 1: NOTES 4/15/63 HEIMBURG
ATTACHMENT 2: NOTES 4/8/63 HEIMBURG

B9122

NOTES 4-22-63 HOELZER

*1. ADPS BRANCH: The ADPS Branch is experiencing a very high level of activity in mechanizing business in engineering support applications. This may be due to interest in mechanization resulting from the Data Center Study. ADPS has received an enthusiastic reception in the Test Division and now has some nine possible applications outlined in that area. In addition, presentations to mechanize travel reporting and certain aspects of procurement and contract activity were made to Management Services and P&C Office. Both organizations are anxious to move immediately into proposed mechanized operations. This will require additional GE Contractor Personnel. In addition, ADPS activities in Central Planning Office, Aeroballistics and Astrionics Divisions are being increased at the specific request of the organizations served. All this activity in ADPS will enable later conversion to Data Center operations to be accomplished more easily.

B 4/22

NOTES 4-22-63 HUETER

H.H. I understand OMSF is budgeting for it, too. Please make sure that it doesn't get fouled up. Seamans is not likely to accept funding by both offices! On the other hand, if OSS keeps it, that's the danger that Silverstein will try to get this money to re-instate the Centaur as third stage, — and all OMSF-oriented mission capabilities of third stage (2nd phase LLV etc) get lost.

1. OSS: The Office of Space Sciences has included in their latest budget submission under new projects a 3rd stage for application of the Saturn 1B. Requested funding levels are 20 million in FY 64, 60 million in FY 65.

In-house concurrence of the approach, the technical scope and resources planned for the MMM/Voyager mission study as requested by OSS has been reached. This will be transmitted to OSS in the form of Preliminary Project Development Plan this week.

2. OART: During my visit of last week to Washington, I ascertained that there is currently no firm requirement for Saturn 1B vehicles within OART. One and one-half million dollars in FY 64 is planned for Micrometeoroid study, primarily to determine if a problem exists or not. Hope exists within OART that they may be able to obtain a passenger ride R&D Saturn. ✓

3. LUNAR LOGISTICS PAYLOAD: The initial draft copies of work statements defining immediate studies were reviewed with OMSF personnel this past week. Suggested changes have been incorporated and these revised work statements will be handcarried to OMSF this afternoon. OMSF indicates that they hope to have approximately 2 million dollars for these studies available at MSFC by April 26. ✓ Accordingly, we will endeavor to have RFQ's ready to go out to the contractors by May 1. It is hoped that we can give the RFQ recipients eight days for review and have a bidders conference and then allow 10 working days for the contractors to prepare their proposals. The possibility of getting these funds committed in FY 63 exists only if these actions receive expeditious handling in the P&C office. It may be necessary that I call on you to support such action. ✓

A meeting has been established for April 23 between MSFC, MSC and OMSF to discuss the total LLS program and the working relationships between the involved Centers. ✓

Attached are synopses of the study effort planned for the Lunar Logistics Payloads as per your request from last week's Notes. ✓

B

90-950-935-60-20

1. STUDY TITLE

The Effects of the Lunar Environment on LLS Payload Materials and Components.

2. STUDY OBJECTIVES

To determine the effects of long-term exposure to the lunar environment (ultra-hard vacuum, extreme temperatures, thermal cycling, lunar dust, space radiations, micrometeoroid impacts, etc.) on structural and other materials such as lubricants, electrical insulators and conductors, coatings, surfaces, thermal control points, micrometeoroid bumper configurations, thermal insulation, etc., which might be used in the LLS payloads. The effects of the lunar environment on electrical and mechanical components, both conventional and fabricated from suitable materials, would also be determined.

3. STUDY MANAGEMENT

Headquarters: W. B. Taylor, MSF
Center: H. Schaefer, MSFC
Contractor: To be selected

4. ESTIMATED COST (In thousands of dollars):

	FY 1963	FY 1964	FY 1965
Approved	400	-	-
Planned	-	775	400
Total	400	775	400

5. DESCRIPTION OF STUDY

First materials, and subsequently components, would be exposed to, and operated under, the severest possible simulated lunar conditions. These conditions would reflect the effects on stored, as well as operating, LLS payload items.

Since little is known about the effects of the impingement of high fluxes of low energy, charged particles on thin films and coatings, and there is reason to believe that appreciable degradation may result from a "sputtering" or erosive process, this will be investigated, as will the effects of ultra-violet radiation on materials.

Attachment 1

The effects of hypervelocity particles on micrometeoroid bumper materials and configurations will be assessed, utilizing the most advanced hypervelocity facilities available, and the best information existing in the literature and developed from future experiments.

Electrical phenomena such as arcing, current carrying capacity, component heating, etc., would also be investigated under simulated lunar conditions, as well as their effects on materials under those conditions.

Whenever possible, combined effects would be simulated and observed. As suitable materials are determined, components such as bearings, seals, etc., would be fabricated and subjected to the simulated lunar conditions. Electrical items such as connectors, switches, heating elements, etc., both conventional, and, where necessary, of special design, would be tested.

6. DURATION OF STUDY

Approximately 2.5 years.

93-990-005-60-20

1. STUDY TITLE:

Beyond-the-Horizon Communications in the Lunar Environment.

2. STUDY OBJECTIVES:

A. To determine RF propagation characteristics in vacuum, specifically on the lunar surface as described in the Apollo Environmental Specification.

B. In order to determine means of point-to-point communication on the lunar surface in the range of 6 to 50 miles, this study will include:

(1) Determination of effects of lunar environment on wave-front propagation, i.e., can transmission beyond the horizon be accomplished by wave-front diffraction at the space/surface interface.

(2) Study of feasibility of transmitting directly through the lunar surface to points beyond the horizon.

(3) Study of feasibility of lunar mountain bounce or scatter propagation.

C. To study the feasibility of using a small wire (landline) paid out from a lunar roving vehicle, as an RF carrier. The RF would be used to carry a voice channel. The study might further determine the following optimum parameters, if the scheme proves feasible:

(1) Wire size (small as possible, consistent with propagation)

(2) Frequencies

(3) Bandwidths

(4) Usable distance (100 miles desirable--20 miles required)

(5) Power

D. This study will not include earth relay communication.

3. STUDY MANAGER:

Headquarters: W. B. Taylor, MAE
Center: W. W. Vaughan, Jr., MSFC
Contractor: To be selected

ATTACHMENT 2

4. ESTIMATED COST: (In thousands of dollars)

	FY-63	FY-64
Approved	100	-
Planned	-	-
Total	100	-

5. DESCRIPTION OF STUDY:

Additional study efforts are required in this area prior to selection of the design of communication techniques for the LLS shelter/laboratory and lunar roving vehicle. Parametric studies of the methods listed in paragraph 2.B. (1), (2) and (3) above will be made, and for each method optimum frequency of operation, power, and reliability (i.e., probability of maintaining continuous contact) will be determined.

"Communications" is defined as TV, FM, and voice signals to be transmitted from a lunar roving vehicle to a lunar shelter; command and voice signals to be transmitted from the shelter to the roving vehicle. However, since the study is solely concerned with propagation, only a carrier need be employed in experiments. It is anticipated that some experiments will be necessary to establish some of the data.

The landline technique, if feasible, has the advantages of being independent of lunar curvature, mountain shadows and earth relay time delays. The voice channel would have a higher probability of continuous contact than other communication channels.

The study would not only study RF propagation along small wires, but would outline a method for laying the wire to assure that it would not break while being deployed or during the lunar day-night environment as defined in the Apollo Environmental Specifications.

6. DURATION OF STUDY:

Approximately 1 year.

98-980-935-60-20

1. STUDY TITLE:

Lunar Roving Vehicle Structure and Running Gear.

2. STUDY OBJECTIVES:

The objective of this experimental program is to define and describe an optimum lunar roving vehicle from the standpoint of structure, steering, suspension, wheel design, and drive system within LLS constraints and to the extent possible within current knowledge of lunar surface characteristics.

3. STUDY MANAGER:

Headquarters - W. B. Taylor, MGE
Center - Georg von Tiesenhausen/MSFC
Contractor - To be Selected

4. ESTIMATED COST (In Thousands of Dollars):

	FY'63	FY'64
Approved	950	---
Planned	----	$500
Total	950	500

5. DESCRIPTION OF STUDY:

Various types of lunar roving vehicle structures, steering, suspension and drive systems, and wheels will be compared and evaluated to determine the optimum type and combination for conditions the vehicle is likely to encounter on the lunar surface. Their ability to withstand earth launch, a trans-lunar trip, landing on the moon, up to a year of storage, and lunar operations will be considered.

In the early phases, an experimental comparison of various flexible non-inflated wheels will be conducted, covering several already proposed, and developing new wheel concepts if necessary.

ATTACHMENT 3

Based upon the foregoing, an integrated concept for a prototype will be evolved and specified. Where appropriate (e.g., in wheel design) the concept will be kept flexible for the timely incorporation of new lunar surface data as it becomes available.

6. DURATION OF STUDY:

Approximately 2 years.

90-900-935-60-20

1. STUDY TITLE

Definition of an Environmental Control System for a Lunar Shelter

2. STUDY OBJECTIVES

The objective of this study is to investigate and define hardware requirements for an environmental control and life support system for application in a two-man lunar shelter. Total mission durations up to 28 days in length during lunar day and night plus a 6-12 months' storage period will be considered. Overall configuration such as power, weight, and volume requirements will be defined.

3. STUDY MANAGER

Headquarters:	W. B. Taylor, MDS
Center:	J. A. Downey, MSFC
Contractor:	To be selected

4. ESTIMATED COST (in thousands of dollars)

	FY 1963	FY 1964
Approved	150	-
Planned	-	-
Total	150	-

5. DESCRIPTION OF STUDY

This study will define a specific environmental control system capable of sustaining a habitable environment within a lunar shelter for a total planned occupancy of 14 days and an additional emergency period of 14 days. The ECS will also include provisions to maintain internal equipment in an operable condition for periods of storage on the lunar surface up to one year. To obtain results which will find immediate and practical application, the investigator will be furnished as much detail as possible concerning typical shelter design details and mission plans. Estimates of the following parameters will be provided in the statement of work to be prepared: Shelter configuration, including volume, available surface area, diameter, height, etc., crew size and their expected activity levels, leak rates, consumable rates, heat loads, atmospheric composition and partial pressure limits and required decompression cycles. Consistent with these specific mission details, a determination will be made of the most promising subsystems for accomplishing atmospheric gas supply and control, humidity control, CO_2 and

trace contaminant removal, water-food-waste management, circulation and thermal control. Maximum utilization will be made of current techniques and hardware being developed for allied programs such as Gemini and Apollo. The investigator will integrate the various selected components and subsystems into an optimum ECS concept which will fulfill the desired mission needs. The study will be closely monitored to determine if additional development effort is required within any specific subsystem. Upon such determination, additional efforts will be immediately required to redirect over-all program schedules. However, it appears that the components and sub-assemblies required for the ECS-life support system for early lunar missions are presently available or within the state-of-the-art.

6. DURATION OF STUDY

Approximately 6 months

98-900-935-60-20

1. STUDY TITLE

Investigation and Development of Thermal Radiators for the Lunar Logistic Payloads

2. STUDY OBJECTIVE

The objective of this program is the development of thermal radiators for the lunar shelter and rover.

3. STUDY MANAGER

Headquarters: W. B. Taylor, MGE
Center: H. Schaefer, MSFC
Contractor: To be selected

4. ESTIMATED COST (in thousands of dollars)

	FY 1963	FY 1964	FY 1965
Approved	50	-	-
Planned	-	125	75
Total	50	125	75

5. DESCRIPTION OF STUDY

The initial effort of the study shall begin with a review of heat transfer information which is specifically applicable to the design for active and passive heat control for lunar logistic payloads.

Further efforts shall be directed toward the development of thermal radiators compatible with the general dimensions of the lunar shelter and rover. Actual radiators shall be designed, built, and tested under simulated lunar environmental conditions.

Use of advances in the state-of-the-art obtained from parallel detail investigations shall be made to the maximum effect.

6. DURATION OF STUDY

Approximately 1.5 years

Attachment 5

90-900-935-60-20

1. TASK TITLE

Engineering Support for LLS pre-development effort

2. TASK OBJECTIVES

To provide engineering support of services and materials to complement the in-house work force at MSFC in the preparation of a detailed program for LLS payloads.

3. TASK MANAGER

Headquarters: None
Center MSFC: Special Assignments Office
Contractor: To be selected

4. ESTIMATED COST (in thousands of dollars)

	FY 1963
Approved	300
Planned	-
Total	300

5. DESCRIPTION OF TASK

This support will be composed of mechanical, electrical, and general engineers plus engineering draftsmen as necessary to support work in the areas of concepts, building of mock-ups, surveys, drawings, and reports preparations relative to the various payloads being developed.

Initially, there will be approximately two men assigned per payload or subsystem; however, their efforts will not necessarily be restricted to that particular area, but could be utilized across the whole development program.

The funding estimates assume that the personnel will be on board May 1 and the funding will cover the balance of this fiscal year plus the first quarter of FY 1964.

6. DURATION OF TASK

5 months

Attachment 6

B 4/22

NOTES 4-22-63 Koelle

1. CAPSULE PRESENTATIONS

We can now offer to you, Dr. Rees, your visitors, and the Division Directors and their senior staffs, the following capsule presentations (about 1 hour each):

a. Trends in Earth-Orbital Transportation Systems
(Given to the Board on April 12)

b. Unconventional Launch Vehicles in the NOVA Payload Class
(Given to Captain Freitag on April 16)

c. Reusable Launch Vehicles in the SATURN I and SATURN V Payload Class
(As you requested, you received one pound of reading material on this subject last week.)

d. Post APOLLO Lunar Transportation Systems Analysis X

e. A Reusable Earth-Lunar Ferry System for Passenger Transportation X

Please give me these occasionally. B

f. Activities and Mode of Operation of the Future Projects Office
(This was our review presentation to you and Dr. Rees.)

g. Status Report on the NOVA Study Activities at Martin and GD/A ✓

2. SPACE STATION

I have discussed with Ed Olling (MSC) by telephone, with proper caution, some of your thinking on this subject. I found that we are not too far apart in the general assessment of the situation. They are now in the process of preparing their latest proposal for the Headquarters task force and will try to get together with us on this subject in the near future. We are planning to have our first internal detailed discussion, on MSFC possible contributions, with Dr. Mrazek, Dr. Lange, Dr. Geissler and Dr. Stuhlinger (or their representatives) in my office on April 30, at 8:30 a.m. We hope to be able to clean up the communication problems and draft a plan of action for your approval. ✓

NOTES 4/22/63 KUERS

1. Saturn V, S-IC Stage:

a. We are making good progress now in the fabrication of the first (upper) bulkhead of the Fuel Test Container. Five meridian welds of acceptable quality have been accomplished.

b. As you remember Boeing will assemble the complete structure vertically in their 200' high facility while we plan to assemble two separate units in our tower which has only 140' crane hook height. The first unit consists of the thrust structure plus fuel container and the second unit comprises the inter tank section, lox container and forward skirt. Both units are then mechanically joined in the horizontal position in Building 4705. For this assembly operation we will support the units on the S-IC transporter and some hydraulic jacks. The first unit will be stationary while the second one, including transporter wheels and jacks will be floated on flat air bearings in order to make minute adjustments for proper alignment possible. The air bearing fixture is being developed by General Motors Research Defense, California.

c. We are getting some good publicity now by articles and pictures in trade magazines. The first article appeared two weeks ago in "Aviation Week" as a result of interviews by the reporter with Boeing and with us. The second article will appear in the next few weeks in the "Metalworking News" magazine.

2. Saturn V, S-II Stage: Explosive forming of waffle gore segments is making progress though NAA has not yet succeeded to produce a part within tolerances which would be acceptable. The forming of thin upper segments, however, looks much worse. It is not so much the basic process which is questionable but the design of the dies which causes the difficulties in spite of many improvements and rework. Two test pieces, a waffle segment and thin segment, explosively formed and chemically milled which are, however, not acceptable parts, have been shipped for tool try-out on welding fixture. We, therefore, recommended to Saturn Systems Office, to direct S&ID to procure these thin segments from a second source by use of the stretch forming method. Such a stretch forming press with sufficient capacity is available at the Northrop plant. A review of sizing of bulkheads by glass rock or aluminum mandrel is scheduled for next week. It is my opinion that the proposed alternate designs for the common bulkhead should be pursued more vigorously by NAA.

3. Saturn I, S-IV Stage: A three day Manufacturing Engineering Working Group Meeting was held with DAC at Los Angeles. The repair of the hydrogen container of the All Systems Vehicle was discussed in detail.

B 4/22
Read thru para 2.

Notes 4-22-63 Lange

1. SATURN I: S-IV Battleship - A successful LOX depletion run of 465 secs. was conducted on 4-19-63. All sub-system operation was apparently good.
S-IV-5 - was shipped from Santa Monica 4-15-63, and was expected to arrive at SACTO on 4-21-63.

2. SATURN V: S-IC - Propellant ducting hardware. As result of 4-18-63 meeting between P&C, P&VE, ME and SAT following actions are being taken: a) Per P&C's request, P&VE will rewrite the sole source justification for Flexonics design and qualification efforts, b) ME will change their PR for hardware and tooling to coincide with P&VE's request, c) Flexonics has already been contacted by P&C relative to a Manufacturing study requested by ME.— It is expected that Flexonics should know of this future business in about two weeks.
Michoud Operations has determined that additional $450,000 is required to complete funding for the tooling to be installed in the Vertical Assembly Building. They need assurance that this amount will be funded in FY-64.
S-II - S&ID FY-64 facilities funding estimate was received, but is totally unacceptable. S&ID was notified and asked for more information.
Facilities Discussion - SAT has learned informally that the Myers Committee report was discussed on 4-19-63 by FEO and HQ's; neither SAT nor OMSF people were present. We understood that a follow-up meeting is to be held at S&ID this week. SAT has not been invited. Additional information is being furnished.
Common Bulkhead Gores - As of 4-18-63, S&ID has not produced acceptable gores. On 4-15-63, Mr. Parker firmly stated that the on-schedule completion of the S-II Stage is not threatened. A decision whether or not to start a small stretch forming R&D effort as recommended by ME and SAT as a backup will be made this week after ME personnel have returned from a trip to S&ID.
Tulsa - S&ID (Mr. Parker) has stated that NAA will account for all plant re-arrangement cost through normal burden and leasehold improvement accounting procedures. NAA has not requested cost reimbursement from the Air Force.
Blast Hazards Program - P&VE (Mr. Riehl) has stated that sufficient emphasis will be placed on the S-II related portion of the program to obtain data as required for a request to the AF for a longer firing duration of the All Systems. Final negotiation with WSMR will further guarantee this information.
Next Quarterly Review is scheduled for 6-4-63 at S&ID, Downey.
S-IVB - Re Notes 4-15-63 (Attachment 1). Your questions concerning "Attitude Control Module Development Test Site" and "NPSH Problem" will be answered with separate memos.

3. APOLLO: New "Mission Control Operations Panel" has been established.
Grumman's LEM configuration is expected at MSC on 5-15-63. This will resolve total S/C configuration by 6-1-63, specifically for SATURN IB missions.
Informal information indicates that MSC will drop its alternate payload requirement for SA-8 meteorite mission.

Notes 4-15-63 Lange B 4/15

1. SATURN I: S-IV Battleship - A successful firing for 437 seconds was conducted on 4-10-63. All systems operated satisfactorily until a facility water pump went out of commission and required stage cutoff. ✓

2. SATURN IB: Preliminary review of Chrysler's redesign proposal (rec'd 4-12-63) indicates that evaluation will be difficult because much material not related to the program is included. ✓

3. SATURN V: S-IC - Formal negotiation for Mod. I is scheduled for week of 4-22-63. ✓

Pre-sculptured versus post-sculptured versus chem milled gore segments. The later show most promise to meet schedules. Ryan Aircraft has adequate facilities and is already under contract to chem mill segments. ✓

P&VE proposal to make F-1 engines interchangeable is being studied. Indications are that further delay in design release and hardware deliveries will be involved. ✓

Propellant ducting hardware - A second source is being set up on the most critical items. MSFC is assisting Arrowhead in procuring critical materials for ducting. ✓

S-II - Next Quarterly Review is tentatively scheduled for 5-14-63 at S&ID. ✓

As of 4-11-63, S&ID has not successfully produced a thin gore section for the common bulkhead. It is anticipated that a parallel effort of stretch forming will be initiated, if a gore is not successfully formed by the high-energy method by mid-April. ✓

S-IVB - Contract for acquisition of equipment and initial design and construction of the Attitude Control Module Development Test Site was signed by DAC on 4-10-63.

S-IVB DAC informally advised M-SAT that a three-month delay in ground test stages and initial SAT IB flight stages will be required to redesign the LOX and LH_2 tanks as requested by the Mechanical Design Integration Working Group. This will be discussed with P&VE prior to redesign authorization. (NPSH problem? B

O.L. In Sacramento? Please send me description & sketch B

4. APOLLO: EDS - Except for two items, agreements with MSC have now been finalized as follows: 1. Automatic abort on angular overrates (IU) ✓ 2. Astronauts' displays of engine status (lights), tank pressures in both stages (analog gages). ✓ 3. Disputed Items to be finalized shortly - Automatic abort on normal acceleration (for slow turn over) and on 2-engines out. Understood. O.K. B.

Spacecraft (Boilerplate)- Arrived last Monday for dynamic tests. ✓

GE - has made for us a nation-wide review of launch vehicle man rating efforts; report is being reviewed. ✓

Micrometeorite Experiments - Coordination with MSC is progressing satisfactorily. ✓

Gemini - Titan II - We are planning to invite members of MSC's Gemini Project to brief you on Gemini-Titan progress.

O.K. Lay-on with Bonnie B

NOTES 4-22-63 MAUS

1. MANPOWER REQUIREMENTS - The Director's Reviews have once again clearly indicated that our FY-1964 personnel ceiling of 7,492 permanent spaces is inadequate for the tasks at hand. Bill Rutledge, who heads our manpower activity is presently working with the divisions and offices in which the greatest shortages exist, to obtain additional substantiating data. This information will be used to prepare a consolidated package for presentation to Mr. Holmes outlining and justifying the several hundred additional personnel spaces required. This presentation should be ready about June 1.

To afford immediate relief, M-CP is preparing vouchers to the divisions and offices allocating in advance the currently approved FY-1964 personnel ceiling. This will allow new personnel to be brought on-board early in FY-1964 and further authenticate our personnel case by showing that all spaces have been filled.

2. MECHANIZATION OF SCHEDULES - The OMSF scheduling currently requires manual updating of about 800 charts each month. To overcome the terrific peak workload, we undertook a study to prepare these schedules using the 4020 computer. We expect that we will meet our self-imposed target date of May 20, for a sample computer run.

Incidentally, I briefed Mr. Holmes on our efforts in this regard during the February Program Review and since then, representatives of OMSF and also MSC have contacted us to express interest in this effort.

B 4/27

NOTES 4-22-63 MRAZEK

1. SA-5 PAYLOAD BALLAST MODIFICATION: A water ballast container will be substituted for the payload ballast as presently designed for SA-5 (12,000 pounds of cast iron plus the approximately 1,000 pounds of lead which would survive reentry). This modification is being done to satisfy a request from Launch Operations Office, Launch Vehicles and Propulsions, OMSF, to reduce the amount of debris reentering from the SA-5 vehicle. The ballast will be designed for a variation of approximately 2,000 pounds to allow for growth factors. Design has been initiated and so far there is no delay.

2. RIFT: Dr. Seamans' office continues to take no action on:

a. The NASA - Navy agreements for use of Hangar #1 for RIFT tank fabrication.

b. The release of RIFT Fiscal Year 1963 Construction of Facilities funds to MSFC.

c. The acquisition of the Georgia Nuclear Laboratories by the Atomic Energy Commission. still under study B

It has, meanwhile B !

These action items are on the agenda for discussion with Mr. Finger on 4-22-63 at MSFC and with Dr. Seamans on 4-25-63 in Washington.

3. HYLASTAR PAYLOAD CAPABILITY NOT COMPETITIVE: A cursory analysis of an S-VI stage using the Aerojet-General Hylastar Engine was made in direct comparison with the MMM (Multi-Mission Module) S-VI stage concept. Based on an escape mission (using the same orbital ignition weight as applied to the MMM S-VI 35,500-pound) the Hylaster concept has a reduced escape payload capability of more than twenty percent.

4. CAMERA CAPSULES: A successful multicapsule (four dummies) ejection test was made to check out the hardware and capsule ejection system. (NOTE: We have requested camera capsules on SATURN V also; two in the engine compartment; two in the LOX container; and two for S-II separation observation.) Good idea! B

5. GENERAL: A thorough evaluation of all measuring information has not revealed, so far, any item separating from SA-4 at the time indicated by Dr. Gruene. (Reference: NOTES 4-15-63 GRUENE, copy attached, and NOTES 4-15-63 MRAZEK, copy attached.) No explanation at this time. Met. balloons!

6. NPSH (NET POSITIVE SUCTION HEAD) PROBLEM: The NPSH problem with the S-IVB finally resulted in no time delay and an undisclosed amount of money. (It will be less than the $10 million indicated.) The S-II also will not be delayed. The quoted cost amounts to about $1.5 million. After a final decision date for the flights #203 and #504 this fall, we actually can determine the weight impact. Presently this action cost about 2,000 pounds payload for the R&D flights only.

Attachment #1: NOTES 4-15-63 GRUENE
Attachment #2: NOTES 4-15-63 MRAZEK

B 4/15

NOTES 4-15-63 GRUENE

Gilly Mrazek !! B

1. SA-4 Debris: We were informed that the Carter Cay C-Band Radar observed the separation of an object from SA-4 at approximately 213 seconds after liftoff. This piece was observed for about 6 1/2 minutes by radar. It appeared flat and light to sail with the air movements. No confirmation could be achieved from viewing movies.

13 J

2. SA-5 Scheduling: Mr. Holmes requested separate day by day schedule for SA-5. M-SAT was informed about this request. Up to now, we have submitted schedules through M-SAT to Headquarters. The dates given for the S-IV checkout in the hangar seem to me over optimistic, but DAC is of the opinion it can be done. ✓

1 of

3. Wet Test: SA-1D will arrive this afternoon at the Cape for fueling test operations on 37. It will be erected Wednesday or Thursday this week. The S-IV stage will be erected the following day. ✓

4. Reliability Engineer: LVO hired a reliability engineer which will be assigned to the LVO staff. He will be responsible to satisfy any MSFC requests in the reliability field. ✓

attachment #1

B 4/15

NOTES 4-15-63 MRAZEK

1. LOCKHEED REORGANIZATION: A new Lockheed division, The Research and Development Division, has been established. The new division is headed by Mr. Elmer P. Wheaton with Dr. J. P. Nash as his assistant. Concurrently, Dr. Roy Smelt succeeds Mr. Wheaton as Vice President and General Manager of the Space Programs Division. Dr. Hal Plank moves up to head of the RIFT project group which is now called "Nuclear Space Programs," having lost division status.

Hardly surprising!

2. SINGLE-ENGINE MMM (MULTI-MISSION MODULE) DRAWBACKS: As a result of a brief analysis comparing the single-engine MMM concept with the two-engine concept, it was found that the single-engine concept would probably be less acceptable.

3. OMSF DIRECTIVE M-DE 8000.004: Office of Manned Space Flight Directive M-DE 8000.004, "Interim Control and Design Goal Weights," dated 3-1-63, embodies a basic management philosophy, the acceptability of which has to be established at MSFC.

"It shall be the responsibility of OMSF, in coordination with the centers, to establish, monitor, and reallocate as required, control weights for each vehicle control point." (NOTE: A control point is a portion of the vehicle in which a control or design weight is established such as S-IC stage, S-II stage, S-IC/S-II interstage, etc.)

W.M. I think this is acceptable. Unless they can swap, all that weight policy doesn't make much sense. We can always dig in and veto! B

W.M. See Grune's NOTES of 4/15! B URGENT

4. S-I/SA-4 FLIGHT EVALUATION: A detailed evaluation of the SA-4 propulsion system shows the flight test was successful and all assigned missions were accomplished. The engine-out condition presented no problems; no adverse effects were noted on any system.

5. PROPELLANT TANK PRESSURE SCHEDULE CHANGE: A recent analysis of the propellant tank pressure schedule for the S-IVB stage showed the tank pressures inadequate to assure minimum engine NPSH (Net Positive Suction Head) during flight. In a meeting between MSFC and Douglas Aircraft Company, it was decided that the tank pressure for initial flights must be increased. The new tank pressures will require a redesign of the tanks which may cause a schedule slip. 4 months, I understand!!

W.M. What happened here? And can we live with that extra weight? B

6. S-II STAGE PROPELLANT UTILIZATION SYSTEM: It was decided in a recent meeting that the closed-loop propellant utilization system for the S-II stage would be retained for SA-504 and subsequent. The closed-loop system in conjunction with a step in engine mixture ratio and thrust offers a significant payload advantage of approximately 2,000 pounds.

7. TRANSFER OF S-I DOCUMENTATION: Seventy-two percent of the total Propulsion and Vehicle Engineering Division drawings (Astrionics Division excluded) have been transferred to Chrysler. Of the remaining twenty-eight percent only a small amount, which is applicable to the S-I stage, will have to be transferred.

8. SATURN V MECHANICAL GROUND SUPPORT EQUIPMENT: To insure that all needs are met, an overall vehicle mechanical ground support equipment matrix will be prepared with temporary personnel assignment at Huntsville from all stage contractors.

Attachment #2

B4427

NOTES 4-22-63 Rudolph

No Notes

B 4/27

NOTES 4-22-63 Stuhlinger

1. METEOROID MEASUREMENT SATELLITE REVIEW: A comprehensive review of the Fairchild contract was held at MSFC on April 18. Present problem areas are the subcontract for meteoroid sensor fabrication; the subcontract for IR attitude sensors; and possible radiation damage to meteoroid sensors. Solutions are in sight. We will keep you posted on our progress in these areas. ✓

2. LLS STUDIES: Hans Hueter and I had a long and very fruitful discussion about RPD's contributions to the LLS project. In the areas of lunar surface physics, radiation effects, and meteoroid physics, RPD will continue to furnish Special Assignments Office (SAO) as many data as possible. RPD's work will be oriented toward the specific needs of SAO. In the areas of roving vehicles and shelters, RPD will help establish design criteria, but will not enter into any design work. The same is true for the area of thermal problems. In the areas of power supplies and communications, RPD will enter into some longer range studies for the next generation projects, following guidelines to be established jointly by SAO, RPD, and possibly Astrionics. In the area of scientific objectives, RPD will develop, in close coordination with SAO, OMSF, OART, OSS, JPL, and MSC, the plan for scientific measurements. Implementation of this plan will be done jointly by SAO, RPD, and possibly Astrionics. In the area of Life Support Systems, RPD will continue its present study and planning effort for another four weeks. At that time, Hans Hueter will determine to what extent he wishes to further utilize RPD. A firm working agreement will then be established between SAO and RPD. E. S.

Very reasonable! Glad to see that you have reached this understanding

This plan is very acceptable to RPD. ✓

3. FY-64 RESEARCH PROGRAM: RPD representatives spent Thursday and Friday of last week in Washington with the various program offices to discuss the FY-64 research requirements and procedures. They also attended a meeting at OMSF concerning the handling of unsolicited proposals received from industry. ✓ B

4. OFFICE OF APPLICATIONS: Two display boxes, the one on electromagnetic forming, and the one on fused amorphous silica, which were prepared by Marshall and sent to NASA Headquarters for use in the Industrial Applications Program, have been forwarded by Headquarters to Lewis for use on a Cleveland, Ohio television program promoting the Industrial Applications Program. ✓

B 4/27

NOTES 4-22-63 WEIDNER

1. J-2 ENGINE: Eight engine tests were conducted this past week for a total of 447 seconds including two firings of 200 seconds each.

I will go out for the J-2 Assessment Meeting which will be held this week at Rocketdyne. It will be the first one under our chairmanship. After our return we can give you our most up-to-date appraisal of the status (see paragraph 2, NOTES 4-8-63 WEIDNER, copy attached).

2. H-1 ENGINE: A design modification of the No. 2 bearing cage (increase of clearance to the outer race) seems to help alleviate a rubbing and overheating problem. The first stainless steel thrust chamber will undergo firing this week.

3. F-1 ENGINE: Rocketdyne is still hoping to run PFRT (Preliminary Flight Rating Test) this fall. The successful present engine testing series is giving substance to their belief that it can be done. It is the current thinking that the PFRT injector will be of the 5U baffle or flat-face type with feed system isolation (kitchen-sink) and some degree of injection velocity reduction. The injector test program for the next few weeks is aimed at optimizing this parameter. While the effects of lower injection velocities are becoming known by such experimentation, the explanation for this phenomenon is not understood yet.

At this time we still have not had a successful run on the nozzle extension skirt. This promises to be a nasty problem.

Present plans provide for an F-1 Engine Test Stand and for component test facilities to be constructed in Mississippi. I suggest that this intention be reviewed once more since we are setting up identical facilities here at Huntsville; it appears that they could serve this purpose well. This would avoid the problem of having a third party (Boeing Company) also getting into engine and engine component testing. Also, we have not applied this same principal, nor are we planning to apply it, in the cases of Douglas, S&ID, or Chrysler.

Contractual go-ahead for fabrication of Test Stand 1-B flame deflector was forwarded to Rocketdyne (see paragraph 5, NOTES 4-8-63 WEIDNER, copy attached).

4. S-IV BATTLESHIP HOT FIRING:

a. Date: April 19, 1963.

b. Duration - 465.6 seconds (LO_2 depletion).

c. Cutoff was given by the LOX injector pressure on engine number 1.

d. The helium heater operated and maintained LO_2 tank pressure for the full duration. This was not a "helium heater one-igniter-out" test as originally planned.

e. Engine number 1004's performance was apparently satisfactory, but a complete evaluation of the gear box vibration data is yet to be done.

Attachment #1: NOTES 4-8-63 WEIDNER

H.W. Please see me on this together with Heimburg URGENT

B and Lange

B4|13

NOTES 4-8-63 WEIDNER

1. RL10 ENGINE: Five more RL10 engine firings, starting at about ambient conditions, without the use of an ejector or a steam evacuation system have been conducted. To date, RL10 engines have undergone over 2,500 firings for a total accumulated duration of 115 hours. At present, ten test positions are being utilized for various engine tests. Production deliveries for the RL10 engine are on schedule.

2. J-2 ENGINE: Seven tests were attempted and prematurely terminated this week. Termination was mainly caused by lack of ignition detection, which was later found to be erroneous. Corrective action on detection circuitry is being taken.

3. J-2 ENGINE NPSH (NET POSITIVE SUCTION HEAD): Steps have been taken in the J-2 development program to introduce improved pump inducer designs on both sides (LOX and hydrogen), which most assuredly will give us reduced NPSH requirements. Enough experimental results should be available by fall of this year so that we can review the stage design again at that time.

4. H-1 ENGINE: Seven tests were conducted with the Low Delta-P fuel injector. Standard bomb and pulse system induced momentary instability. The engine returned, however, to stable operation in all tests.

5. F-1 ENGINE: There was an instability occurrence on engine 010 at about 150 seconds of mainstage firing--no hardware damage. A total of 358 seconds of mainstage firing at full thrust was conducted on engines 009, 010, and 011 from 3-28-63 to 4-4-63.

Thirteen injector tests were conducted to separate and evaluate the effects on stability of low injection velocities and propellant feed system isolation devices.

Funds for fabrication and installation of a newly designed test stand 1-B flame deflector are urgently needed. Gimbal testing has to be suspended until replacement can be effected.

Support service building site at Edwards Air Force Base has been approved by the Air Force.

6. F-1 INJECTOR STABILITY (GENERAL): While no real solution has yet been found to our problem, several approaches have indicated some degree of potential relief. These are (a) Feed system decoupling devices, (b) Reduced propellant injection velocities (equivalent to increased injection hole diameter), (c) Baffling (combustion side), (d) "Wagon wheel" concept (produces a face-heating problem, however). Full effort is continuing in the pursuit of all other injector concepts. It is my feeling that definite progress is being made.

7. S-IVB BATTLESHIP TESTING STATUS: On 4-2-63 a hydrogen leak at a connection boss started a fire and damaged electrical wiring of the hydraulic pumps on engine #3. It was cut off at 31 seconds. This stresses the importance of armored cables.

H.W. J-2 program doesn't seem to get off the pad! What's status? B

H.W. How can I help you? B

Action taken?

Attachment #1

Copies sent to Rees, Dannon, Mann 4/24/63. JG

NOTES TO HOLMES 4-23-63 DEBUS

1. LOC Organization: Implementation action has been started in all elements of LOC to bring the approved organization into being as soon as practicable. Thanks for your help on this.

2. MSFC-LOC Agreement: A revised draft for an agreement between MSFC and LOC has been furnished to MSFC and we expect a sign-off by May 1st.

3. Transfer: Official assignment of Al Siepert to LOC became effective 15 April.

4. Facility Maintenance Support, MILA: Action was initiated April 16th with PAA to bring all facility work being performed by PAA in MILA under work order procedures. It is estimated that these procedures can be instituted, and all work thenceforth documented by 1 May 63.

5. Information Center MA-9: Carriage House Motel, Cocoa Beach, low bidder to provide Press Information Center and auditorium for MA-9 PIO operations. LOC PIO making arrangements for MA-9 press operations at Honolulu, Hawaii also.

6. Semi-Mobile Food Service Units for MILA: We plan to provide three semi-mobile food service units for MILA. Total estimated cost is $40,575. The first unit is scheduled for use September 1, 1963, second December 1, 1963, third January 1, 1964. The three units will meet food service requirements in MILA until such time as permanent cafeteria facilities are completed. The units will then be relocated to serve other impacted areas as required until such time as Launch Complex 39 is completed and the units are sited to support operations in the more remote areas from permanent cafeteria facilities.

7. Status of GAO Activity: The Field Projects Branch, Goddard Space Flight Center, has requested LOC to act as Liaison Representative for them in matters concerning General Accounting Office activities at AMR. We have accepted.

The team of GAO auditors out of Patrick Air Force Base reviewing AMR activities such as supply, transportation and photographic services continue their reviews. LOC, MSC and GSFC supply activities including contractors are currently being analyzed by GAO.

Mr. Gorsey of GAO recently completed an audit survey of audio visual-public affairs at the Atlantic Missile Range. Exception was

taken to the duplication of functions in Photographic Coordinator positions at the AMR. GAO plans to investigate expenditures for Photographic Coordinators by certain contractors of both NASA and the Air Force.

8. S-I - S-IV Stage: S-I dynamics stage arrived for the Complex 37B wet test. S-I was erected Friday, April 19, and the S-IV stage on Saturday, April 20.

9. Fourth Quarter Review: Information, data and charts were prepared for the Fourth Quarter Review in response to a request from OMSF/ML. The information covered the status of LOC's programs through the first three quarters of FY 63, requirements for the remainder of the fiscal year, and a preview of the first quarter FY 64 requirements.

10. "Make or Buy" Decisions on Items Concerning G. E. (Follow-up item from last week.): It was mutually agreed between LOC and G. E. representatives that the propellant loading control system would be a "make" item and the data link a "buy" item. The contractors who submitted proposals have been so informed; in the case of the data link, the contractor's permission has been requested to turn their proposals over to G. E. for procurement.

11. Apollo System Specification: A meeting was held with NASA OMSF personnel to discuss the scope of the Apollo Systems Specification Document. This will be a control document, will be under the direct supervision of Dr. Shea's office, and will be supported by a system of specifications under Center control.

12. Four-laning Indian River Causeway: A reprogramming action was forwarded to NASA Headquarters to provide $5,172,000 additional funds for four-laning the Indian River Causeway.

13. Block II Launcher Arms: The third (final) set of eight cast steel launcher arms (Block II type) fabricated by Hayes International Corporation, has been accepted per Form DD-250. These arms will be shipped to Test Division, MSFC, for testing prior to shipment to LC 34. The first set of launcher arms is installed at LC 37 (Pad B). The cracks which developed in the second set of launcher arms during the tests at Test Division have been inspected; a repair has been initiated, as well as a modification to the undamaged arms, by Hayes International Corporation. After completion of the repair and the modification, this second set of arms will be tested again before shipment to LC 37 (Pad A). An inspection of the launcher arms on LC 37 (Pad B) revealed no cracks and a generous fillet in the area under discussion, making it safe to conclude that the modification need not be incorporated in this set of arms.

14. CIF Operational Concept: Work is continuing on the revising and updating of a report which describes the functions, general description and operating concept of the CIF. The preliminary design review on the CIF is planned for Monday, April 22. The building criteria is scheduled to be delivered to the design agency about April 30.

April 29 1963

B5-2

NOTES 4/29/63 CONSTAN

1. TUBE FLARING

In reference to Item 2 of Notes-Constan dated 4/22/63 (Attachment 1) it was determined that M-ME does not fully comply with the MC-146 tube flaring specification. It was decided that the specification would be modified so that CCSD can comply with the modified requirements and yet produce tube flares of high quality. The requirements have been modified as a result of a meeting held among M-P&VE, M-ME, M-QUAL and M-SAT. The modified specification will be transmitted through the Contracting Officer to CCSD. ✓

2. REINSPECTION OF SA-8 TANKS

As a result of the deficiency found on harness and probes in SA-5 tanks, reinspection of SA-8 tanks has been accomplished at Michoud. Two probes were found to be deficient and will be replaced. ✓

3. S-1-8 TAIL UNIT ASSEMBLY

S-1-8 tail unit assembly was placed in the clustering fixture April 24, 1963, approximately 2 weeks ahead of schedule. The main purpose for early installation is to confirm tooling fixture qualifications. The clustering area (station) for S-1-8 is expected to be fully operational on April 29, 1963. Miscellaneous installation to fully complete the tail unit assembly will be accomplished during clustering. The 105" LOX tank assembly operation is planned to begin April 29, 1963. ✓

1 enc:
Attachment 1

NOTES 4-29-63 FORTUNE B 5/2

1. Mississippi Test Operations Information Center: An Information Center was opened in the former Shorty's 43 Club at MTO site on April 17, to furnish information and assistance to the numerous people seeking information or employment. It is right on the main thoroughfare. The Center is staffed with a receptionist from MTO and a personnel specialist from MSFC Personnel Office. Since opening, an average of 75 visitors a day have come to the Center. Diverting the flow of these people to this area has relieved traffic and congestion at our Headquarters tremendously. ✓

2. Air Transportation to MTO: Last Monday, Bill Morrow, Marion Kent, and myself met with Messrs. Hall and Courtney, VP's, Southern Airways. These gentlemen stopped by on their way to Washington to inform us that Southern Airways is proposing a direct flight from Huntsville to Gulfport then to New Orleans in the mornings, omitting the much maligned Muscle Shoals stop. In addition, they are proposing adding Picayune to their afternoon flight (DC-3) from Mobile to Gulfport to New Orleans. There's some doubt about getting approval for the Huntsville-Gulfport-New Orleans flight since this would put them in the trunk line business. Eastern Air Lines would probably object, since they would still have to stop at Muscle Shoals. However, such a flight would be very beneficial to us inasmuch as an employee could go via commercial air to MTO and return to Huntsville in one day. ✓

3. Ground Breaking Ceremony: Officials in the cities surrounding MTO site have been notified that the ceremony has been called off until early July, or other appropriate time. So far, everyone has accepted the explanation that we could not get all the Washington officials together on the date desired. Senator Stennis told me last Saturday he could come on a Monday or Friday, during the early summer, but not in the middle of the week. He also gave us a very good play in his speech at Mississippi State University that a.m., even interrupting it to introduce Mrs. Fortune and myself to all the alumni gathered for the occasion. ✓

4. Suggested re-routing of Interstate Highway 10: John Smith, Commissioner of State Highways, Mississippi, has written me that he has reconsidered the location of Interstate 10 and believes it should be relocated further south, to go from the presently planned E. Pearl River crossing directly east to Highway 43, following it to Highway 90. This latter would be four-laned from there to Bay St. Louis Bridge. Such a plan would be advantageous to us, improving employee access to MTO from the South and East, and is very much desired by Hancock and Harrison County personnel. A similar route had been suggested by MSFC a year ago but rejected by Smith as too marshy in the western end. Now that he is faced with four-laning Highway 90 whether or not it is tied in with Interstate 10, it makes sense, saving money, and being in the public interest, as well. It means 3 db less noise on the road, as well, from the acoustic disturbance viewpoints. ✓

NOTES 4/29/63 GEISSLER B 5/2

*1. PIRD Meeting: A working session of personnel from LOC, MSC, and MSFC was held on April 23/24 in Huntsville to discuss the consolidation of the Apollo Program Instrumentation Requirements Document (PIRD) for Saturn I, Saturn IB and Saturn V. Satisfactory arrangements were made and a tentative schedule has been established. This work is done in support of the Mission Control Operations Panel. ✓

*2. Project LIEF Study Group: A joint MSFC-LOC study group for the planned Launch Information Exchange Facility (LIEF) has been established. Kick-off meeting was on April 25. Purpose of LIEF is to establish a wide-band, high-speed data link between MSFC and LOC to be used for exchange of engineering data and similar information during pre-launch and launch of Saturn R&D vehicles. Was approved by Brainerd Holmes during Man. Council Meeting 4-30-63 B EG.

3. Saturn V Wind Response: Saturn V's response to various wind conditions has been computed. Vehicle degrees-of-freedom considered were propellant oscillations and two bending modes. An ideal control system was assumed which follows the drift minimum principle. Results show that a modest amount of engine deflection is required to offset the combined effects of fuel sloshing modes and rigid body mode effects. Wind inputs were based on real and synthetic profile conditions. In two of the study cases, the upper limit of engine deflection rate was reached, but the system recovered without any harmful effects. ✓

NOTES 4/29/63 GORMAN B 5/2

Negative Report

B5/2

NOTES 4-29-63 GRAU

1. SA-5 VEHICLE: S-1-5 Vehicle is in final pressure and functional checkout. The vehicle was moved into the pressure cell on April 22, 1963.

Rework is required on the Lox pre-valves and Lox fill and drain valves. This rework is time consuming and an estimate of completion, including test and acceptance, cannot be made at present; therefore, the impact on the accelerated schedule has not been determined.

*2. S-IV CHECKOUT OPERATION: Reference April 11 meeting in the Director's Conference Room, where the Quality Assurance Division made recommendations on improving S-IV stage checkout at Santa Monica. DAC has replied to these recommendations and a separate group has been established for checkout operations, reporting directly to Mr. T. Gordon, Chief of Engineering. In addition, a second office has been established for Vehicle Flight Readiness under Vice-President, Mr. Bromberg. The Office of Flight Readiness is on the same level as the DAC Saturn Program Manager's Office.

Douglas Aircraft Company plans to have 25 more people in this office. One major function will be that of veto power over stage movements from one facility to another and it will also act as a sounding board for MSFC in getting fast results on major problems when other routes have failed.

Sounds mighty good to me! B

3. MICROMETEOROID: According to contractual requirements as specified in NASA Quality Assurance Document NPC 200-2, Fairchild Stratos Corporation is responsible for the Quality Assurance Programs of their subcontractors. They have encountered serious resistance from the G. T. Schjeldahl Company, Northfield, Minnesota (manufacturer of micrometeoroid sensor panels) on the grounds that proprietary information is involved. An oral agreement has been made with both Schjeldahl and Fairchild wherein the Government (MSFC and/or a Government Inspection Agency) will cover in-process inspection with final product inspection and testing to be covered by Fairchild. We are awaiting written confirmation of this plan through the MSFC Project Office.

B5/2

NOTES 4-29-63 GRUENE

1. Assignment of A. Zeiler and R. Moser: During my absence from 5 May 1963 through 5 June 1963, A. Zeiler will represent me at MSFC and R. Moser will represent me at the Cape. ✓

2. Wet Test on Complex 37: We encountered some problems with contamination of LH_2 lines in the Complex. We hope to be able to solve the problems before the LH_2 tanking tests begin. ✓

Mac
Please make sure he's invited to our Board Meetings. Exec. Mtgs. too, or no deputies? LThat did we settle on?
B

B5-2

NOTES-4/29/63-HAEUSSERMANN

1. SA-5 ROLL AZIMUTH SIMULATION: In order to place SA-5 on its proper azimuth it is necessary to execute a 15 degree roll maneuver between 8 and 20 seconds after lift off. In performing preliminary roll control studies vehicle dynamics resulting from the roll maneuver were investigated by analog simulation. This simulation incorporated analog models of the rigid body, servo system, propellant sloshing and the roll maneuver hardware. From the studies the maximum engine deflection resulting from the roll maneuver was found to be approximately 0.9 degree with 3.7 degree per second per second maximum vehicle angular acceleration.

Subsequent studies were performed incorporating prototype flight hardware into the system to investigate compatibility of the interconnected hardware and the vehicle dynamics resulting from the roll maneuver executed by the ST-90-S. This simulation included the ST-90-S stabilized platform mounted on the roll axis of a 3 axis table, a 12 channel breadboard control computer, the shaping network and the H-1 engine and back up structure. Close agreement was found between the vehicle response from the roll maneuver executed by the flight control hardware and the analog simulation performed earlier. The maximum engine deflection was found to be approximately 0.85 degree with approximately 3.2 degrees per second per second maximum vehicle angular acceleration.

No control or dynamics problems resulted from these studies. Curves presenting the vehicle response of the rigid body with propellant sloshing with and without hardware are attached. (Photos of the hardware test setup are also attached.)* ✓✓

Enc:
2 Charts
3 Photos

*Charts and Photos attached to Dr. von Braun's copy only.

B 5/2

NOTES 4/29/63 HEIMBURG

1. MTF: RFQ package for Saturn V Technical Systems Procurement Plan (Phase I) being released to Aetron today. Meeting scheduled at NASA Headquarters Friday, 5/3/63, may resolve problem re telephone system of plan. ✓ K.H.

NASA Headquarters approval of cryogenics procurement plan still not received. Location of plant sole problem to be resolved. Three more Weeks! Then let's hit them with an Urgent Action Message! B

2. S-IV-5: The stage is presently located in the checkout hanger at Sacramento. To maintain the schedule, S-IV-5 was shipped short 40 items which will be installed while in this building. ✓

*3. S-IV, SACTO, BATTLESHIP AND ALL-SYSTEMS: Full duration (465 seconds) successfully completed on battleship stage, 4/25/63. A second test was terminated at 21.5 seconds due to fire indication on engines No. 3, 4, and 6. After the test, it was observed that Engine No 3 leaked from inside chamber to outside from under the "Mae West." Engine No. 3 removed; spare being shipped from Santa Monica. ✓

Propellant loading test on the All-systems Stage has been rescheduled for Tuesday, 4/30/63, due to bad crack in lox vent line bellows inside lox tank. ✓

4. SOUND SUPPRESSION TEST STAND (OLD "HOP STAND"): The first phase of testing has been completed at the Sound Suppression Test Stand. The purpose of testing was to determine the baseline of the sound level. Six tests were run with a total time of approximately 70 seconds on a dry deflector. The longest test was 30 seconds. The dry deflector has been removed and installation of the sound suppressor will start immediately. No adverse reports on noise from personnel in Plants Area 1. ✓

5. S-I-6: S-I-6 was received and installed Monday, 4/22/63. Short duration test tentatively scheduled 5/16/63. ✓

6. GSE, Swing Arms No. 2 & 3, LC-37B Spares: The LOC-designed accessories have been installed on swing arm No. 2 (S-IV Aft.). Tests to date, dry and with LN_2 as the simulated propellant, have proven satisfactory. Test runs were successfully made under simulated rain conditions. Liquid hydrogen tests are scheduled this week. The LOC housing is scheduled for vibration tests at DAC this same period. ✓

SPECIAL NOTE:

Mr. Heimburg at SACTO this week; due to return Sunday, 5/5/63. Driscoll to return to MSFC, Thursday, 5/2/63. ✓

B 5/2

NOTES 4-29-63 HOELZER

No Report.

B 5/2

NOTES 4-29-63 HUETER

1. LUNAR PAYLOAD DEVELOPMENT: Initial contact with MSC on the lunar payload development was made on April 23 with Mr. Faget, Assistant Director for Engineering & Development. Faget's attitude was somewhat of a negative sense in that he questioned the advisability of expending any effort in payload development at this time; however, he pledged his cooperation in all areas, particularly flight support, communications and LEM truck payload integration. Our prime contact at MSC on the payload is to be Mr. Gillespie, Mr. Faget's technical assistant. The LEM truck appears to exist in concept only with little or no details. ✓

The approximately 2 million dollars of FY 63 funding was expected to have been approved Friday although we have not received confirmation of this. Statements of Work for the proposed studies have been reviewed by OMSF and have been hand-carried to the MSFC Purchasing & Contracting Office. ✓

2. MULTIPLE MISSION MODULE: On April 25, a meeting was held with all Division representatives concerned. The existing documentation of Centaur as third stage (SV) was discussed. The general opinion was that the present documentation is rather obsolete and a thorough investigation of all changes made on Centaur has to be made to have a basis for comparison with the MSFC concept of MMM. A suggestion was made to have a new study of Centaur as third stage (SV) made (like the GD/A study of September 1961) by industry with the present Saturn and Centaur configuration, to lighten the workload on the Divisions.

H H.

If GD/A makes this study, Lewis may insist on being "contracting officer". "Single entry" concept. In this case it's clear what the outcome will be.
If another company makes it, the problems of information feed by GD/A arises.
What do you recommend?

B

NOTES 4-29-63 Koelle B 5/2

1. STUDY CONTRACTOR SELECTION

One of our system studies sponsored by OART concerns the development of a mathematical model of planetary transportation systems with emphais on evaluation of propulsion concepts for a large number of missions. We received nine proposals. The evaluation committee headed by Mr. Gradecak (FPO) selected GD/A and Martin/Denver to make one study each for $75,000. NAA was a close third. Do you go along with our selection? → Yes. B

2. NUCLEAR PULSE VEHICLE STUDY

As far as we can determine, Dr. Seamans has signed off on the $100,000 study with General Atomics and we should receive the money in the next few days. We hope to be able to obligate this money before July 1. ✓

* Jim 3. COST/RELIABILITY TRADE-OFF STUDY

Our last study of this fiscal year, title as above, sponsored by Captain Freitag's office, was approved by Dr. Seamans. This is a continuation of an STL study from last year. This will close the budget book for FY 1963 as far as our studies are concerned. ✓

H.H.K.

During our 4-30-63 Management Council Mtg. the following question came up (and was discussed extensively): "Can we honestly say that we'll never be able to launch a manned planetary expedition, unless we have a Nova of some kind? Have we ever analyzed, in some detail, the problems involved in a multiple-Sat. V-earth-to-orbit logistics operation? We should expect orbital docking to become a routine operation by 1970". Request comments and suggestions re studies. B 5/22

B 5/2

NOTES 4/29/63 KUERS

1. Saturn V, S-IC Stage: (a) Last week we established the final technique for welding of the big outlet fitting into gore segments. The lox tunnel outlet and manhole were welded and accepted by Quality Division. The seventh gore is on the meridian welder. (b) Modifications on the Dollar Weld Fixture resulting from test welds have been accomplished. Test welding on this fixture is being continued. (c) The erection of the weld fixture for welding skin panels into cylindrical sections has been completed. Test welding is under way. The first two acceptable skin panels have arrived from Wichita. The fabrication process for these panels is as follows: first they are milled in the T-37 condition on tape controlled milling machines; then they are wrapped around a holding fixture and heat for aging is applied by which the parts form to the final shape. This sounds very simple. However, the accuracy requirements for location of the milled T-stringers of one cylindrical section to the next section are very stringent and would not allow trimming after forming. Other methods of forming like roll forming, peening (Boeing's favored process), and brake forming were tried on subscale parts without satisfactory results. (d) The heavy and chemically milled gore segments for the lower bulkhead of the fuel test container have been received from Ryan, San Diego. (e) The Thrust Structure mock-up has been moved to the Mock-Up Building.

2. Saturn V, S-II Stage: (a) Progress in explosive forming of gore segments during the past week has demonstrated that NAA's program will prove satisfactory for producing acceptable parts. Additional schedule delays are anticipated as NAA refines their techniques. Our recommendation of backing up this program by a stretch forming program will be discussed on Tuesday, April 30, at Los Angeles. The fact that the explosive die has developed cracks in the die surface, requiring major rework after completion of the first set of gore segments, makes this back-up program even more important. (b) NAA has agreed to pursue the 54" aluminum mandrel concept after preliminary tests have proved that the basic concept is sound. The design of this mandrel, providing for a complete cycle of cooling to -120°F and heating to +340°F, is complete. This item will also be discussed in our meeting at NAA.

3. Saturn I, S-I Stage: (a) A second shift with a limited number of people is working on SA-5 during final check-out to accomplish minor rework and to incorporate further small changes. (b) The payload adapter for SA-6 has been completed.

Notes 4-29-63 Lange B5/2

1. SATURN I & IB: S-IV Battleship - A successful lox depletion run of 465 secs. was accomplished on 4-25-63. Cold helium bottle pressure was 2800 psia at start and 500 psia at cutoff. Injector pressure switch for engine #5 gave the cutoff signal. Hydraulic centering for all six engines was accomplished. Helium heater and PU operations were satisfactory. A second firing on 4-25-63, with one ignitor out on the helium heater to show ignition redundancy, was cut off after 21 seconds due to fire. Engine #3 had chamber leak. ✓

All Systems Vehicle - Cracked bellow on the internal lox pressurization line has to be replaced. Tanking test is now scheduled for 4-30-63. ✓

SA-7 Bonus Payload - Re Memo, M-SAT, dtd 4-19-63 (Attachment 1) - This was the aluminum polished sphere for radar calibration for MIT and NASA Office of Applications. Due to interference established at MSFC with other missions and receipt of OMSF (Mr. Gautraud) TWX dtd 4-5-63, that Bonus Payload should not be further considered, MSFC has ceased consideration of this payload. Office of Applications, Mr. Jaffe, was notified by M-SAT TWX on 4-8-63. ✓

2. SATURN V: S-IC - Negotiation with Boeing on X-Ray Tooling and support hardware for M-QUAL to support the Ground Test Program were completed on 4-19-63. The modification was finalized for $195,000 plus a fee of $12,750. First tool will be delivered on 7-6-63.

Firm cost proposal for activation of the MTO S-IC Complex was received on 4-26-63. The proposal is for $28.2 Million including a fee of $1.8 Million. MSFC evaluation will commence.

Mod I (Plan V) - After pre-negotiation among P&C, ME and M-SAT, the formal negotiation with Boeing commenced on 4-26-63. It is anticipated that the negotiations will be completed by 5-10-63. ✓

Propellant Ducting Hardware - Second source production study contract has been negotiated with Flexonics by P&C. ✓

S-II - Re Notes 4-22-63 Kuers (Attachment 2) - A special review is being held at S&ID on 4-30-63 between S&ID, P&VE, ME and M-SAT (Dr. Lange) and others to review the status of progress in this area and to implement alternate measures. ✓

S-IVB - Four aft dome segments have been formed on the stretch press. These segments are .303 inches in thickness, but the press seems to stretch them with no difficulty. Only one of the four segments will require explosive sizing. ✓

→ O.L.
Does this include F-1 test stand and component facility at MTF, — or just the S-IC test stand? I plan to have a meeting with Weidner (which I hope you can attend) on those other 2 items at MTF.
B

B 5/2

NOTES 4-29-63 MAUS

1. NEW STARTS - The consolidated FY 65 Preliminary Budget Package prepared by Dee Wyatt's Office of Programs shows under OSS:

	FY 64	FY 65	
Third Stage S1B	$20M	$60M	(total 210)

In the meantime OMSF has increased and resubmitted its requirements to Dr. Seamans. They include (among others):

Lunar Logistic System	44.2	85.8	
These figures include:			
Payload Development (MSFC)	32.3	35.1	(total 183)
LLS payload test facility (MSFC)		52	(total 97.5)

This is important in regard to our consideration of AEDC Tullahoma facilities.

Cryogenic Space Stage Devel.	19.1	45.1	(total 137.1)
Cryogenic Space Stage Facilities	19.2	15.6	(total 43.2)

These figures include:
Stage development facility (MSFC) 8.2

Balance of total is for modification of launch facilities.

2. ADVANCED & SUPPORTING RESEARCH & TECHNOLOGY PROGRAMMING PROCEDURE - Dr. Seamans approved the SR&T and AR&T programming procedure which was proposed by OART. We anticipate call from hdqs. this week to submit total proposed FY 64 ART & SRT program by May 15. This package will be separated into sections showing the effort we propose for sponsorship of each headquarters program office. We will furnish total package to each program office; OART will then coordinate with the other program offices and arrive at the "Total MSFC level of effort" which will be recommended to Dr. Seamans for approval.

Regardless of where a task was funded in FY 63, we will propose the task for FY 64 under the coding structure which most accurately describes the work to be accomplished.

B5/2

NOTES 4-29-63 MRAZEK

1. SATURN V, S-IC STAGE MOCK-UP: The tail structure of this mock-up is essentially complete. The mock-up may be reviewed in the Mock-up Building immediately west of Building 4705. Still visit at B

2. GROUND ACOUSTIC PREDICTION: The trajectory on a MINUTEMAN flight test was sent to the Structures Branch, this Division, by Col. Lee, Bio-Astrionics, Patrick Air Force Base. This information will be used to check ground acoustic predictions for a rapidly receding vehicle. ✓

3. GIMBAL FREQUENCY: A review of the F-1 engine gimbal system analyses made by the Boeing Company and the Structures Branch revealed improper assumptions in the Boeing analysis. The minimum gimbal frequency of this engine is 6.7 cps rather than 8.7 cps as reported by the Boeing Company in the S-IC review meeting. This is being coordinated with Boeing. ✓

4. RL10 HELIUM HEATER: A vibration fatigue analysis was completed on the RL10 helium heater assembly which indicated fatigue failure will not occur due to vibration. ✓

*5. S-IV DESIGN INTEGRATION WORKING GROUP MEETING: Shock, vibration, and other environmental tests are not in accordance to MSFC internal procedures. To date, out of 165 components, only five final test reports have been released. From data reported by Douglas Aircraft Company, it is felt that in the propulsion area the Qualification Test Program of the S-IV Stage Components is inadequate.

gm

W.M. Suggestion? B

6. CONSPICUOUS RADAR TARGET, SA-4: There is still no plausible explanation. ✓ Debus thinks it was a met balloon. B

NOTES 4/29/63 - Rudolph B5/2

No Notes

3512

NOTES 4-29-63 Stuhlinger

* 1. FY 1964 SUPPORTING RESEARCH AND TECHNOLOGY: The portion of the overall MSFC supporting research and technology program for which RPD is responsible has been compiled for submission to OART and the other Program Offices through Central Planning Office. The breakdown of the proposed program is:

HEADQUARTERS PROGRAM OFFICE	NO. TASKS	FUNDING
Office of Space Sciences	29	$ 3,070,000
Office of Manned Space Flight	170	17,955,000
Office of Advanced Research & Technology	221	22,183,000
		$43,288,000

The above does not include chemical propulsion program requirements (OMSF and OART), nuclear vehicle technology, OTDA requirements, or the requirements of the Future Projects Office.

2. RESEARCH PROGRAMMING WITH HEADQUARTERS: On Friday, April 26, I met with Ray Bisplinghoff to discuss research programming procedures. He plans to let the centers have the freedom to reprogram within sub-programs. However, he re-stated that Bob Seamans desires (a) that all research programs be coordinated by OART and (b) that he personally review the programs in detail before final authorization. Bob Freitag is attempting to include project-connected research of MSFC, MSC, and LOC directly in project funds, with "no strings attached other than after-the-fact reporting." Hope he succeeds. I left copies of a memo for record with Ray Bisplinghoff and Bob Freitag which describes an MSFC proposal for efficient research programming. A copy is being sent to you today for your information. Bonnie where is it? B

In your "attention" folder which you haven't read yet. BO 5/1/63

3. UNIVERSITY CENTER GRADUATE PROGRAM: Graduate program negotiations between the University of Alabama and the Army continued on April 25-26. There is general optimism that a contract agreement will be reached by May 1 for the following year at a level close to $300,000, and that the difference between this amount and the present joint Army-NASA fund ($250,000) can be found.

4. RADIATION ANALYSIS OF METEOROID MEASUREMENT SATELLITE: The Nuclear and Ion Physics Branch of RPD, in cooperation with Langley Research Center, is presently engaged in a theoretical evaluation of the radiation problems for the Meteoroid Measurement Satellite. Specifically, we will try to develop a method for using experimental results from ground laboratories to predict the behavior of the meteoroid sensors in orbit.

* 5. METEOROID MEASUREMENT PROJECT: The Meteoroid Measurement Project continues basically on schedule. The following major events have taken place: (1) An additional $2.2M has been received from Headquarters; 1.9M will be put against Fairchilds contract this week; .3M will be used for supporting small contract (P&VE, MED, ASTR, etc.) effort. Headquarters is looking into the possibility of additional .3M authorization in 30 days. (2) A replacement for Mr. Pace has not yet been secured. We may need help from you, Dr. Rees, or Col. James in this area. Dr. Johnson will discuss this with Col. James this week.

→ E.S.,
I'm greatly interested in a sound, sound suggestion! B

NOTES 4-29-63 WEIDNER

B 5/2

1. J-2 REVIEW MEETING REPORT: As you know, the J-2 program in its initial layout has, in our opinion, been greatly underestimated. Much of our effort over the past 32 months has been directed towards its deepening and bolstering; at times even against some resistance on the part of Rocketdyne.

Initial Program: $44.7 million, two engine test positions, 45 months to PFRT.

Present Program: $123 million (including $35 million overrun), three engine test positions, with two more to be activated during the course of this year, 55 months to PFRT.

Persistent reports indicated that progress still was not satisfactory and that this was not entirely due to technical reasons. Last week we conducted a two-day review meeting for which we explicitly had asked Rocketdyne to prepare for us a sober appraisal of the present status. They had prepared themselves thoroughly and the results seemed to be somewhat surprising to them. (a) They admit now that they have grossly underestimated the size, complexity, and time required to do this job. The number of problems still to be cleared up is out of line with the time span remaining. (b) The number of components and engines in support of their work is too restricted to get a vigorous testing program going. Unique manufacturing facilities are only now beginning to be available in numbers promising to give some relief to this situation. (c) This, coupled with the fact that until recently only one engine position was available to the program, seems to be the main underlying cause of this state. (d) They suggest postponing PFRT and first ground-test engine deliveries by another three months, trying to maintain delivery of first flight engine as is. This would avoid too early siphoning of badly needed experimental hardware from engine development.

We urged them to immediately: (a) Lift their partly self-imposed restrictions and plan for substantially more effort and hardware to go into the program during this critical period. This undoubtedly will require help on our part. (b) Establish for the next half year or so a senior program manager with stature and authority to cut across their own departmental lines (design, facilities, manufacturing, etc.). (c) As a control tool, establish and keep current a realistic week-to-week working plan showing in detail how to get from here to PFRT.

MSFC, in turn, has to do the following: (a) Review with S&ID and Douglas Aircraft Company our early engine requirement schedule and establish a fall-back plan; Saturn Systems Office to give this top attention. (b) Review engine specifications, trying to allow for initial relief. (Both of these actions have been initiated.)

I would suggest that this situation is serious enough to warrant your attention. A briefing for you, presenting their new plan, seems to be in order. Perhaps we can time it to coincide with Bob Freitag's next visit around mid-May.

H.W

Yes, by all means, Please arrange with Bonnie B

2. RL10 FLUORINE DEMONSTRATION: John Sloop (OART) is ready to contract with Pratt and Whitney Aircraft for a fluorine program costing approximately $1.2 million. The plan provides for five RL10A-1 engines and five injectors to be made available to the program. The initial goal would essentially be to demonstrate that the RL10 engine, with slight modifications, could be fired using fluorine-hydrogen. Company-financed test facilities are scheduled to be available 9-63. Interference with our present operations is expected to be limited. Question is: to what extent we might be interested in the future results of such endeavor. Sloop tends to give management responsibility to Lewis Research Center. Silverstein doesn't want a fight with MSFC and looks toward Sloop to decide it. With a firmer attitude, we might influence it to come our way--if we want to. As discussed today B 5/2